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Development of a Food Checklist for Fat, Saturated Fat, and Sodium for Middle School Students

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We developed a brief, inexpensive, culturally sensitive 24-hour food checklist to identify middle school students enrolled in the Child and Adolescent Trial for Cardiovascular Health (CATCH), whose food choices over the previous day were high in total fat, saturated fat, or sodium. Food checklists were coded from 224 24-hour recalls previously collected from CATCH students in the fifth grade to simulate responses to it. Administration procedures for the food checklist were then pretested on 71 schoolchildren in grades 6 through 8. Regression results indicated that consumption of 10 items on the checklist had a positive effect on fat intake; 13, on saturated fat; and 11, on sodium intake. Some foods were removed from the checklist because of their small effect size or infrequency of reported consumption; others were combined or subdivided to form new food groups, or were reworded to improve comprehension. The final food checklist consisted of 40 foods or food groups. The median same-day test-retest reliability Kappa was 0.85; item validity, as measured by the median Kappa statistic, was 0.54. The food checklist procedures described may be helpful for developing similar food checklists. Nutrition educators and teachers may find that the food checklist is a useful educational tool for informing students about their fat intakes.

Although 24-hour recalls and food records are the most accurate of the dietary assessment methods available, they require a great deal of instruction and are too expensive and burdensome to use in large-scale community studies (28). Thus brief, inexpensive, valid, culturally appropriate dietary assessment instruments that can be used to categorize children's relative intakes of nutrients are needed. Food checklists are useful in large-scale studies for detecting changes in food choices and for quantifying and ranking individuals' intakes of specific nutrients. When used to assess the prior day's food consumption, food checklists can be calibrated by comparing results with 24-hour recalls.

The Child and Adolescent Trial for Cardiovascular Health (CATCH) was a large-scale, school- and family-based, multicenter intervention trial aimed at decreasing cardiovascular risk factors and making organizational-level changes. The cohort consisted of elementary schoolchildren and their schools. Details of the CATCH study are described elsewhere (21). Particular attention was directed at educating children on positive eating behaviors to improve and lower intakes of sodium, total fat, and saturated fat (19).

A food checklist was designed as a short, inexpensive diet assessment tool to detect differences between the target nutrients in the diets of the

CATCH cohort as they were followed longitudinally. Use of a checklist appeared promising, but existing checklists were either inappropriate for children or the targeted nutrients differed from those of interest in CATCH. For example, Kristal and colleagues (14) used a 19-item checklist of foods high in fat and fiber—although neither saturated fat nor sodium was included—to study women's intakes. For 16 foods, Kappa values exceeded 0.6 when food items reported on the checklist and 24-hour recalls were compared.

In students followed from the sixth through the twelfth grades in the Class of '89 Study, an 18-item scale or paired food choice was used (13). This scale detected differences in high-fat food choices between students residing in intervention and control communities, and scores suggestive of a preference for high-fat foods correlated well with lack of exercise and smoking (12,13,17,20). Middle school students in the CATCH intervention group differed from controls on their usual choices between food pairs on the Health Behavior Questionnaire (16). However, items on the Class of '89 and the CATCH Health Behavior Questionnaire food-choice scale asked subjects to indicate which of two food pairs they usually choose rather than asking them to report their food consumption.

The purpose of this study was to develop a brief food checklist to report intakes of foods that were major contributors to middle school children's intake of fat, saturated fat, or sodium over the previous day. This checklist needed to be inexpensive, culturally sensitive, and suitable for administration in group settings to a multiethnic group of middle and junior high school students.

Methods

Sample

The data we used consisted of 224 24-hour recalls, 56 at each of the four CATCH sites: San Diego, CA; New Orleans, LA; Minneapolis, MN; and Austin, TX. These recalls were selected randomly from all 1,182 recalls collected in the CATCH study after stratifying by site when the cohort children were in the fifth grade, in the spring of 1994. The multiethnic sample reflected the composition of the CATCH population: 44 percent females and 56 percent males; 68 percent White, 13 percent Black, 15 percent Hispanic, and 4 percent Native American, Asian American, and others. The sample size was selected to permit us to detect reliably food-item effect sizes of 0.35 or greater (8), sizes we considered large enough to be of dietary importance. Effect size is the difference in mean nutrient intake levels between those who consumed a food versus those who did not, divided by the standard deviation of the measured nutrient.

Preliminary List of Foods Included on the Food Checklist

Developing the food checklist involved (1) compiling the preliminary list of foods to be included on the food checklist, (2) coding the food checklist by using previously obtained 24-hour recall information to simulate student response, (3) calibrating the food checklist to 24-hour recalls to produce a final version of it for administration, and (4) formalizing administration procedures after pretesting the food checklist administration with students.

The food checklist was a modification of a questionnaire used in the Youth Risk Behavior Survey (11), with some items from the Food Behavior Checklist

(14). It included food choices, reported by third graders in the CATCH pilot study, that were high in fat, saturated fat, and sodium and similar foods identified in other studies (3-5,10, 26,30). Other questionnaires that focused on fat, saturated fat, and sodium were also reviewed even if they were not designed for children or adolescents (1,2,6,9,11,14,24,25,29). Foods that contributed substantially to intakes of target nutrients, because they were consumed frequently, were also included (5,26,30). In addition, special attention was paid to inclusion of relevant ethnic foods.

To cluster foods into groups that were similar in their nutrient composition, we examined tables that reported food composition for total fat, saturated fat, and sodium based on nutrients per 100 grams of each food item. Items considered by themselves and items added to foods, such as butter and salad dressing, were considered for inclusion. Whenever possible, foods and groups of foods were categorized similarly to those employed on existing instruments, such as on the food frequency questionnaire of the Third National Health and Nutrition Examination Survey (NHANES III) (22) and the Block Brief Fat Screener (2).

Analysis of Existing 24-Hour Recall Records

Foods to be included in the checklist were evaluated by using a criterion-oriented approach similar to that described by Posner and colleagues (23). For this analysis, a random subsample of 224 of the records collected in 1994 from fifth grade CATCH students using 24-hour recalls was used. These recalls were collected by trained and certified CATCH interviewers who used standard techniques and a nonquantified food record as a memo prompt during their

recalls (18). The Minnesota Nutrition Data System (NDS) software¹ was used to compute nutrient intakes. The food records were listed on the checklist, examined, and scored "yes" if the food was eaten and "no" if it was not. Foods on the recall that were not on the checklist were not scored. The criterion was the extent of agreement between the score on the food checklist and the intake of a specific nutrient (fat, saturated fat, or sodium) on the 24-hour recall of the previous day as assessed from stepwise linear regression.

For this study, copies of the previously collected 24-hour recalls were obtained for each of the students. Five nutritionists (one at each of the four CATCH field sites and one at the Data Coordinating Center) were trained to use standardized written instructions to code the food checklist from 24-hour recall printouts and followed these procedures. The site nutritionists then completed a food checklist for each of 56 recalls collected at each site, and the Data Coordinating Center nutritionist filled out a total of 56 food checklists (14 collected at each site). The nutritionists reviewed each food on the recall and then marked the corresponding item on the food checklist, thereby providing a simulated checklist data set for study purposes.

To evaluate inter-coder reliability, another Data Coordinating Center nutritionist coded all 224 recalls onto checklists (table 1). Agreement between the coding of the quality assurance coder and that of the five nutritionists was tested with a generalized Kappa statistic. Kappa values of 0.6 or greater are generally regarded to indicate "substantial" levels of inter-rater agreement (15). Kappa values ranged

from 0.4 to 1.0, with 38 items exceeding 0.6 Kappa values. Inter-coder reliability was excellent, with Kappas usually exceeding 0.9 for individual food groups, indicating nearly perfect agreement in coding between the quality assurance nutritionist and the five nutritionists (site and Data Coordinating Center). It was recognized that nutrient correlations between children's 24-hour recalls and checklists coded by nutritionists were higher than would be found if children had completed the food checklist. In actual use, children may forget foods they have eaten or misinterpret checklist items.

Pretest of the Administration of the Food Checklist

The food checklist was administered, by using a standardized protocol, to a total of 71 nonrandomly selected sixth- (n=1), seventh- (n=60), and eighth- (n=10) grade students representative of the ethnic groups in the CATCH, with nearly equal numbers of males and females in seven groups at three of the sites (California, Louisiana, and Texas). Students were instructed to circle "yes" next to any food group or food from which they had consumed at least one bite or one sip on the previous day. They were instructed to categorize unlisted foods such as sandwiches by their separate components (e.g., bread, ham, cheese, butter), and to circle all the items that applied.

Following the administration of the food checklist, the students were asked a predesignated series of questions by a food checklist administrator to assess their understanding of instructions and the clarity of items on the checklist. Feedback from the students' observations, suggestions of the checklist administrators, and the recommendations of the CATCH Dietary Assessment Working Group were used to revise the protocol used to administer the food checklist.

Statistical Methods

Using the 224 recalls and their corresponding food checklists, we conducted a stepwise linear regression analysis to evaluate the ability of items on the food checklist to explain the variance in nutrient levels obtained with the 24-hour recalls. Individual food items were assigned a "1" if the item was checked on the food checklist and a "0" if it was not. Regression analyses were used to determine the relative contributions of individual foods or groups of foods on the food checklist (independent or predictor variables) to nutrient intakes from 24-hour recalls for each of the dependent variables (e.g., fat, saturated fat, and sodium). The regression coefficients were then converted to effect sizes (regression coefficient divided by the standard deviation for each nutrient) (8).

Foods or food groups with small effect sizes (i.e., less than 0.20) for each target nutrient and those reported infrequently (by less than 2 percent of the students) were reviewed by the CATCH Dietary Assessment Working Group. Some items with small effect sizes, such as bread and cookies, were retained based on their high frequency of consumption or status as major contributors of target nutrients as indicated in other studies. Otherwise, such items were eliminated from the checklist. The food items and food categories on the food checklist were edited for readability. Further testing and validation studies as well as additional details on scoring are described in greater detail elsewhere (27).

Results

The most commonly eaten foods were bread, cookies, cold cereal, and potato chips—all eaten by more than 44 percent of the children on the recall day (table 1).

¹The software was developed by the Nutrition Coordinating Center (NCC), University of Minnesota, Minneapolis, MN (Food Database version 4a; Nutrient Database version 19).

Table 1. Final food checklist items with frequency of consumption, inter-coder reliability, and effect sizes on 224 middle school children

Food checklist number (final list)	Food category	Percent of children eating item ¹	Kappa values ²	Effect sizes ³		
				Percent Kcal from fat	Percent Kcal from saturated fat	Sodium (mg per 1,000 kcal)
22	Bread	78	0.85	•	•	•
29	Cookies	54	0.95	•	•	•
23	Cold cereal	49	0.99	•	•	•
26	Potato chips	44	0.99	0.28	•	•
14	Cheese	36	0.92	•	0.37	0.32
2	Hamburgers	34	0.92	0.49	0.43	•
39	Ketchup	33	0.94	•	•	•
3	Fried chicken	30	0.97	0.41	•	•
17	2% fat milk	30	0.95	0.42	0.56	•
21	Biscuits	30	0.97	•	•	•
31	Ice cream	27	0.94	•	0.62	•
19	French fries	26	0.99	•	•	0.24
32	Chocolate candy	26	0.96	•	0.28	•
16	Whole milk	25	0.95	0.47	0.69	•
7	Cold cuts	24	0.93	•	•	0.54
33	Margarine	23	0.90	•	•	•
35	Mayonnaise	21	0.93	0.25	•	•
12	Pizza	19	0.96	•	0.37	0.33
28	Peanut butter	16	0.98	0.38	•	•
8	Bacon	12	0.83	0.95	0.55	0.58
27	Pickles	11	1.00	•	•	0.59
11	Spaghetti with meat sauce	11	0.95	•	•	•
34	Butter	10	0.88	•	0.58	•
24	Pancakes	9	0.83	•	•	•
13	Cheese dishes ⁴	8	0.87	•	0.45	•
10	Soup	8	1.00	•	•	0.86
18	Beans ⁵	8	0.66	•	•	•
1	Beef	7	0.70	•	•	•
6	Hot dogs	7	0.97	0.66	0.62	0.56
37	Gravy	7	0.97	0.56	•	0.34
4	Turkey	6	0.96	•	0.41	•
38	Whipped cream	6	0.96	•	0.56	•
15	Eggs	5	1.00	•	•	•
20	Spanish rice	5	0.82	•	•	0.45
40	Salt	5	0.65	•	•	0.58
5	Meat salad	<1	0.66	•	•	•
36	Salad dressings ⁶	—	—	—	—	—
9	Pork	7	0.97	•	•	•
25	Pretzels	4	1.00	•	•	•
30	Donuts ⁶	—	—	—	—	—

• Effect size < 0.20.

— No scores are available because the item was originally part of another food group.

¹ Site and Data Coordinating Center coding.

² Quality assurance coding versus site and Data Coordinating Center coding.

³ Effect sizes were calculated by dividing the regression coefficient by the standard deviation for each nutrient.

⁴ Macaroni and cheese, cheese nachos, cheese enchiladas, quesadillas.

⁵ Red, white, baked, refried.

⁶ Salad dressings and donuts are included only to illustrate all items on the final checklist; these items were originally included in other groups.

Note: Foods or food groups with Kappa values <0.60 are not shown in the table.

The effect sizes show that consumption of 10 of the 40 food items/groups had a positive influence on fat intake expressed as percentage of calories. Thirteen food items/groups had a similar effect on percentage of calories from saturated fat. And 11 food items/groups had a similar effect on sodium intake per 1,000 calories. Larger effect sizes indicate a greater contribution to target nutrient intakes on the 24-hour recall. Effect sizes ranged from less than 0.2 to 0.95 (bacon) for percentage of kilocalories from fat; less than 0.22 to 0.69 (whole milk) for saturated fat, and less than 0.2 to 0.86 (soup) for sodium.

Twenty-one of the original 45 food items/groups had minor² effects on nutrient profiles for total fat, saturated fat, or sodium levels. These were examined further, and six items (biscuits, bread, cold cereals, cookies, margarine, and ketchup) with minor effects on nutrient profiles were retained on the checklist because they were consumed by a substantial number (23 to 78 percent) of the students. Six other items (beef, pork, spaghetti with meat sauce, eggs, and pretzels) were retained because they made substantial contributions to intakes of one or more of the CATCH target nutrients reported in other studies (3-5,10,26,30).

Meat salads (e.g., tuna, chicken, or shrimp salad) and pancakes were infrequently consumed and had minor effect sizes but were retained because the older middle and junior high school students, the target population, would likely consume these foods. Canned beans (pork and beans and pinto beans) were infrequently consumed but retained because of their popularity among Hispanic-American children.

Six items were deleted (canned vegetables, mashed potatoes, granola, trail mix, dips, and french toast). Two food items/groups were recategorized into groups that more adequately reflected nutrient content. Cookies were divided into two groups (cookies and donuts) to narrow the range of fat content per 100 grams in each group. In addition, barbecue sauce was combined with ketchup with the rationale that this regrouping might reveal larger effect sizes in future testing with older children.

On the food checklist pretest, instructions took about 5 minutes and the food checklist took 10 minutes for students to complete. Specific references to lowfat and low-sodium foods were not included in the instructions to students, because structured feedback with students revealed that they were unable to distinguish between lowfat, fat-free, and regular food items. However, these issues were discussed in directions to the administrators. Students who ate a lowfat or low-sodium version of a food on the food checklist and asked the administrators how to complete the checklist were instructed to circle "yes" next to the checklist item. A list of commonly asked questions and standard answers for administrators was developed based on questions encountered in the pretest administration.

This developmental study was done in preparation for a validation study, which compared seventh grade students' 24-hour recalls with checklists they completed the same day. The purpose of this phase of the development was to identify the appropriate food items for the checklist. The psychometric properties of the instrument were tested after this process was completed. These and other aspects of the scoring and validation study are reported in detail elsewhere (27).

The most commonly eaten foods were bread, cookies, cold cereal, and potato chips—all eaten by more than 44 percent of the children on the recall day.

²Standard deviation less than 0.2.

... the 40-item prototype food checklist developed to serve as a surrogate to the 24-hour recall was feasible.

Briefly, the median same-day test-retest reliability Kappa was 0.85, and item validity—as measured by the median Kappa statistic comparing student choices with those of staff nutritionists—was 0.54 (27). The final food checklist items shown in table 1 consisted of 40 items (4 single foods, 25 food categories, 2 beverages, 3 single condiments, and 6 condiment groups).

Discussion

The major finding of this study is that the 40-item prototype food checklist developed to serve as a surrogate to the 24-hour recall was feasible. Nearly half of the items on the original checklist had no appreciable effects on regressions for total fat, saturated fat, and sodium intake levels—even after extensive efforts had been made to identify all possible foods that might have such an influence.

The checklist is useful but it has limitations. For example, it is difficult to code mixed dishes such as pizza and spaghetti with meat sauce accurately since individual recipes may vary greatly in their fat and sodium contents from one setting to another. Therefore, individual scores may need to be adjusted when the checklist is used with other populations. Portion size and frequency of consumption were not specified on the food checklist; but they may have influenced intakes of target nutrients reported in 24-hour recalls. Coders may have been inaccurate in identifying checklist items from information on recalls; although when the checklist is used with other populations, we believe such errors were small.

The food checklist we developed was designed to assess group level differences by gender or between intervention and control groups, and not

individual intakes. Since this checklist asks only about 1-day's intake, a single administration cannot be used to assess habitual dietary intakes of individuals. There is a large intra-individual variation in diet, so information from a single day's intake—either by 24-hour recall or by food checklist—is an efficient way to rank individuals' habitual nutrient intake. This also can be used to study the associations between intakes and physiological or behavioral risk factors. It is possible that multiple administrations of the food checklist would be better indicators of "usual" intakes of the nutrients studied. However, this hypothesis needs to be examined and tested further. The food checklist must be administered to large samples to obtain the same degree of precision in detecting differences in relative intake levels from group to group that would be achieved using the 24-hour recall.

Food checklists like the one we have developed are somewhat time- and population-specific because food availability and eating habits differ between groups and over time. Some groups may have consumed foods not included in the checklists that were significant contributors to intakes of targeted nutrients, or the food supply or food intake patterns may have changed over time. Therefore, food checklists, such as ours, require further testing and calibration for use with other populations, and they must be periodically updated.

The food checklist may be useful as a supplement to other tools, such as the Youth Risk Factor Behavior Surveillance System, used in population-based monitoring systems, in health care, and in educational settings when the target group is middle school students and a brief assessment of dietary intakes of fat, saturated fat, and sodium is needed (7). These and other brief methods for determining dietary fat levels deserve

consideration, keeping in mind issues of validity for the intended purpose (31,32). A downloadable version of the checklist, scoring key, and administration instructions is available at the CATCH project Web site, along with other CATCH data collection forms.

Applications

Techniques described in this article can be used to develop food checklists to measure intakes of other nutrients. The food checklist presented here is a valid, reliable, and useful tool for assessing middle school students' food choices contributing to fat, saturated fat, and sodium in their diets. A copy of the checklist and procedures for administering it are available on the Internet at <http://www.sph.uth.tmc.edu:8052/chprd/catch/>. However, it requires further testing and calibration before it can be used with other populations.

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References

1. Block, G. 1992. Simplified fat screener. *Journal of Nutrition* 124:2296S-2298S.
2. Block, G., Clifford, C., Naughton, M., Henderson, M., and McAdams, M. 1989. A brief dietary screen for high fat intake. *Journal of Nutrition Education* 21:199-207.
3. Block, G., Dresser, C., Hartman, A., and Carroll, M. 1985. Nutrient sources in the American diet: Quantitative data from NHANES II Survey 1: Vitamins and minerals. *American Journal of Epidemiology* 122:13-26.
4. Block, G., Dresser, C., Hartman, A., and Carroll, M. 1985. Nutrient sources in the American diet: Quantitative data from NHANES II Survey: Macronutrients and fat. *American Journal of Epidemiology* 122:27-40.
5. Block, G., Norris, J., Mandel, R., and DiSogra, C. 1995. Sources of energy and six nutrients of low income Hispanic-American women and their children: Quantitative data from NHANES 1982-1984. *Journal of the American Dietetic Association* 95:195-208.
6. Blum, R., Harris, L., Resnick, M., and Rosenwinkel, K. 1989. Technical report on the Adolescent Health Survey, University of Minnesota.
7. Byers, T., Serdula, M., Kuester, S., Mendlein, J., Ballew, C., and McPherson, R. 1997. Dietary surveillance for states and communities. *American Journal of Clinical Nutrition* 65:1210S-1214S.
8. Cohen, J. 1988. *Statistical Power Analysis for the Behavioral Sciences*. Lawrence Erlbaum Associates, Mahwah, NJ.
9. Dennison, B. 1994. Young Children's Diet Assessment Questionnaire. *Journal of Nutrition* 124:2303S.
10. Hampl, J. and Betts, N. 1995. Comparisons of dietary intake and sources of fat in low- and high-fat diets of 18- to 24-year olds. *Journal of the American Dietetic Association* 95:893-897.
11. Kann, L., Warren, W., Collins, J., Ross, J., Collins, B., and Kolbe, L. 1993. Results from the national school-based 1991 Youth Risk Behavior Survey and progress toward achieving related health objectives for the nation. *Public Health Reports* 108(suppl):47-67.
12. Kelder, S., Perry, C., Klepp, K., and Lytle, L. 1994. Longitudinal tracking of adolescent smoking, physical activity and food choice behaviors. *American Journal of Public Health* 84:1121-1126.
13. Kelder, S., Perry, C., Lytle, L., and Klepp, K. 1995. Community-wide youth nutrition education: Long term outcomes of the Minnesota Heart Health Program. *Health Education: Research, Theory and Practice* 10:119-131.

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14. Kristal, A., Abrams, B., Thornquist, M., DiSogra, L., Croyle, R., Shattuck, A., and Henry, H. 1990. Development and evaluation of a food use checklist for evaluation of community nutrition interventions. *American Journal of Public Health* 89:1318-1322.
 15. Landis, R. and Koch, G. 1997. The measurement of observed agreement for categorical data. *Biometrics* 33:159-174.
 16. Luepker, R.V., Perry, C.L., McKinlay, S.M., Nader, P.R., Parcel, G.S., Stone, E.J., Webber, L.S., Elder, J.P., Feldman, H.A., Johnson, C.C., Kelder, S.H., and Wu, H. 1996. Outcomes of a field trial to improve children's dietary patterns and physical activity: The Child and Adolescent Trial for Cardiovascular Health (CATCH). *JAMA* 275:768-776.
 17. Lytle, L., Kelder, S., Perry, C., and Klepp, K. 1995. Covariance of adolescent health behaviors: The Class of '89 Study. *Health Education: Research, Theory and Practice* 10:133-146.
 18. Lytle, L.A., Nichaman, M.Z., Obarzanek, E., Glovsky, E., Montgomery, D., Nicklas, T., Zive, M., and Feldman, H. 1993. Validation of 24-hour recalls assisted by food records in third-grade children. *Journal of the American Dietetic Association* 93:1431-1436.
 19. Parcel, G., Edmundson, E., Perry, C., Feldman, H., O'Hara-Thompkins, N., Nader, P., Johnson, C., and Stone, E. 1995. Measurement of self-efficacy for diet-related behaviors among elementary school children. *Journal of School Health* 65:23-27.
 20. Perry, C., Klepp, K., and Sillers, C. 1989. Community-wide strategies for cardiovascular health: The Minnesota Heart Health Youth Program. *Health Education: Research, Theory and Practice* 4:87-101.
 21. Perry, C., Stone, E., Parcel, G., Ellison, R., Nader, P., Webber, L., and Luepker, R. 1990. School-based cardiovascular promotion: The Child and Adolescent Trial for Cardiovascular Health. *Journal of School Health* 60:406-413.
 22. Plan and Operation of the Third National Health and Nutrition Examination Survey, 1988-94. 1994. Centers for Disease Control and Prevention/National Center for Health Statistics, Hyattsville, MD.
 23. Posner, B., Jette, A., Smith, K., and Miller, D. 1993. Nutrition and health risks in the elderly: The Nutrition Screening Initiative. *American Journal of Public Health* 83:972-978.
 24. Resnick, M., Bearman, P., Blum, R., Bauman, K., Harris, K., Jones, J., Tabor, J., Beuhring, T., Sieving, R., Shew, M., Ireland, M., Beringer, L., and Udry, J. 1997. Protecting adolescents from harm, findings from the National Longitudinal Study on Adolescent Health. *JAMA* 278:823-832.
 25. Rockett, H., Wolf, A., and Colditz, G. 1995. Development and reproducibility of a food frequency questionnaire to assess diets of older children and adolescents. *JAMA* 95:336-340.

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26. Simons-Morton, B., Baranowski, T., Parcel, G., O'Hara, N., and Matteson, R. 1990. Children's frequency of consumption of foods high in fat and sodium. *American Journal of Preventive Medicine* 6:218-227.
27. Smith, K., Hoelscher, D.M., Lytle, L.A., Dwyer, J.T., Nicklas, T.A., and Zive, M.M. 2001. Reliability and validity of the CATCH food checklist: A self report instrument to measure fat and sodium intake by middle school students. *Journal of the American Dietetic Association* 101:635-642; 647.
28. Thompson, F. and Byers, T. 1994. Dietary Assessment Resource Manual. *Journal of Nutrition* 124:2245S-2311S.
29. Witschi, J., Ellison, R., Doane, D., Vorkink, G., Slack, W., and Stare, F. 1985. Dietary sodium reduction among students: Feasibility and acceptance. *Journal of the American Dietetic Association* 85:816-821.
30. Witschi, J.C., Capper, A.L., and Ellison, R.C. 1990. Sources of fat, fatty acids, and cholesterol in the diets of adolescents. *Journal of the American Dietetic Association* 90:1429-1431.
31. Yaroch, E.A. 2000. Eight faces of validity. *Journal of the American Dietetic Association* 100(2):256.
32. Yaroch, A.L., Resnicow, K., and Khan, L.K. 2000. Validity and reliability of qualitative dietary fat index questionnaires: A review. *Journal of the American Dietetic Association* 100(2):240-243.

Using Credit to Cover Living Expenses: A Profile of a Potentially Risky Behavior

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Although previous research has examined people's general attitude toward using credit, no previous research has examined factors that influence people's attitude toward the use of credit when their income is cut. This study explored people's attitude toward borrowing money to cover living expenses when income is cut. The 1995 Survey of Consumer Finances (SCF) was used to examine attitude toward the use of credit. A multivariate logistic regression analysis showed that households who were younger, non-White, with less household income, and who incurred late debt payments were more likely to say that it was acceptable to use credit to cover living expenses when income was cut. The findings suggest a need for education targeted to specific groups of adults and the need for personal finance education for high school students, the consumers of the future.

The use of credit is an accepted practice in the United States.

Households are able to meet their wants and needs by using various forms of credit available in the market. Several factors have been associated with growth in consumer debt: such as higher incomes, a general increase in both the standard and level of living, the marketing of new forms of credit, and a greater acceptance of debt (20). The wider distribution of credit cards could indicate that lenders are including a larger number of risky borrowers (3) who are likely to include households with lower or less stable incomes. If so, it could be important to study how these households feel about using credit in a stressful situation, such as during the loss or reduction of income.

Research on the use of credit has shown that attitudes toward credit usually constitute good predictors of credit use. Studies in 1970, 1986, 1993, and 1996 have found that attitudes are significantly related to the use of credit cards (6, 7, 10, 17). Panel data from the 1983

and 1989 Survey of Consumer Finances (SCF) provide information about the proportion of households who believe it is acceptable to borrow to cover living expenses when income is cut (13).

Researchers have shown that consumers with a positive attitude toward the use of credit were more likely to use credit cards from both banks and retail stores (10), and 43 percent of these credit card users have said it was acceptable to borrow to cover living expenses (7). People with favorable attitudes toward borrowing are more likely not to pay their monthly credit card balances in-full at the end of the month, compared with those who do (7). Other researchers have shown that consumers who think it is acceptable to borrow had a higher credit card balance than do those with negative attitudes toward borrowing (4). Further, people who thought of themselves as "upper class" believed it was more appropriate to borrow to purchase luxury goods than did people of lower or middle socioeconomic status (17).

Various aspects of financial status and household demographic characteristics (e.g., age, marital status, household size, race, and life cycle stage) have been examined in previous studies. Although the focus of the studies, the sources of data, and the methods differ slightly, the findings suggest that specific demographic characteristics are frequently related to income and payment difficulties.

Census Bureau data were used to describe changes in the composition of American households from 1980 to 1988 (19). Households headed by a person younger than 25 had the most serious financial problems because they tended to have low incomes and were likely to face difficulties when meeting their basic household needs. In a study using data from the 1990 Survey of Consumer Attitudes, researchers found that household heads who were divorced or separated, had more children under 18 years of age, and who had a low level of education had problems paying their credit obligations on time (9). Other investigators studied changes in household debt by using three cross-sectional studies: the 1983, 1989, and 1992 SCF (8). These households showed that households headed by young people and non-Whites had a high incidence of late credit payments. Other studies showed that age was related negatively to the amount of debt carried by households (20,21).

Other factors that might affect the use of credit when income is cut include level of education, health status, and the possibility of receiving government health insurance. A low level of education is likely to mean that people have jobs or occupations with lower pay and could also mean that people are less likely to understand the terminology or information about lending that is used or made available

in the borrowing process (3,5). A study comparing borrowers and non-borrowers found that borrowers spent more money on health insurance and prescription drugs and medical equipment, believed to be due to poor health (11).

Another approach to examining income and payment difficulties is to consider the household's economic characteristics. Research has shown that low-income households have the highest debt payment-to-income ratio and few financial assets to meet their payment obligations (8). Also, a high percentage of these households have reported having income levels lower than they expected, which affected their ability to pay debts as scheduled. Further, the households with a high incidence of late payments tended to have both low income and little net worth. In another study, researchers found that households with payment difficulties had low incomes and high debt payment-to-income ratios and were renters (9).

A study exploring consumer debt burden revealed that as net income and total assets increased, consumer debt increased, and as consumer debt increased, year-end savings declined (20). A study of credit card use in poor households suggested that the increased use of credit by poor families may be related to a decrease in welfare funding (2).

No previous research has examined factors such as demographic and economic characteristics that might determine consumers' attitudes toward borrowing when income is cut. Thus, the purpose of this exploratory study is to develop a profile of households who say they will use credit to cover living expenses when income is cut and to examine factors that might explain that attitude. Using credit as a protection

against the hardship of losing income resembles the use of precautionary savings to smooth consumption. Unlike savings, the use of credit leaves households with a debt that may be difficult to pay, especially when household income is low. A focus on this problem is relevant for consumer educators and lenders. The findings of this study will provide helpful information to consumer educators who can target those households who would benefit from learning how to manage their finances more effectively and to lenders who are likely to learn more about the households who represent a higher risk.

Methods

Data and Sample

We used data from the 1995 SCF, which provides detailed information on financial and demographic characteristics of U.S. households and is sponsored by the Federal Reserve Board and other agencies (16). The 1995 SCF consists of 4,299 households. Of these, 2,780 families were selected by using a standard multistage probability design. The other 1,519 families were selected by using a special list drawn from tax records to oversample wealthy families. For our study, the entire sample of 4,299 households was used and weighted to represent the population of interest. To deal with missing information on individual items in survey data, analysts at the Federal Reserve Board used multivariate statistical methods to impute missing data. Imputation of missing data results in a multiple number of complete data sets. Since 1989, the SCF uses multiple imputation techniques to deal with missing data. This procedure creates five data sets (called "implicate" data sets). In this study, we use the first implicate.

Variables

The dependent variable was developed from one of the questions in the 1995 SCF, which was asked by a facilitator, that measured attitude toward specific uses of credit: "People have many different reasons for borrowing money which they pay back over a period of time. For each of the questions I read, please tell me whether you feel it is all right for someone like yourself to borrow money." The choices were "to cover living expenses when income is cut, to cover the expenses of a vacation trip, to finance the purchase of a fur coat or jewelry, to finance the purchase of a car, or to finance educational expenses." Each part of the question was answered with a "yes" or "no." Only the question "to cover living expenses when income is cut" was selected for study. The dependent variable was "Is it all right to borrow money when income is cut?" It was coded as 1 if the response was "yes" and 0 for "no" (table 1). To examine the relationship between this dichotomous dependent variable and the independent variables, we used a logistic regression (15).

The independent variables represent demographic, economic, credit, and attitudinal factors. The demographic variables consisted of age, marital status, race, education, and household size. Age was coded as a categorical variable with four groups: household heads younger than 35 years old, 35 to 44, 45 to 54, and 55 or older. These categories were intended to represent the life cycle stages of the household (16,20).

Race was coded as 1 if the household head was White and 0 otherwise; marital status was coded as 1 if the household head was married and 0 if otherwise (16). The highest level of education attained by the household head and household size were continuous variables.

Table 1. Coding of dependent and independent variables

Variable	Measurement
Dependent	
<i>Do you feel it is all right to borrow money to cover living expenses when income is cut?</i>	1 = yes, 0 = no
Independent	
Age	
Less than 35	1 = yes, 0 = no
35 - 44	1 = yes, 0 = no
45 - 54	1 = yes, 0 = no
55 and older (reference group)	1 = yes, 0 = no
Marital status	1 = married, 0 = otherwise ¹
Race	1 = White, 0 = otherwise ²
Level of education	Continuous
Household size	Continuous
Household income	
Less than \$10,000	1 = yes, 0 = no
\$10,000 - \$19,999	1 = yes, 0 = no
\$20,000 - \$29,999	1 = yes, 0 = no
\$30,000 - \$49,999	1 = yes, 0 = no
\$50,000 or more (reference group)	1 = yes, 0 = no
Home ownership	1 = renter, 0 = homeowner
Liquid assets	Continuous
Government health insurance	1 = eligible, 0 = otherwise
Number of credit cards	Continuous
Payment pattern	
No payment obligations (reference group)	1 = yes, 0 = no
Late payments	1 = yes, 0 = no
Payment on schedule	1 = yes, 0 = no
Credit card balance outstanding	Continuous
Expectation about income	1 = income is lower than expected, 0 = no
Self-reported health	1 = health is fair or poor, 0 = otherwise

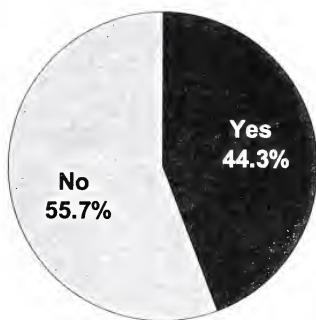
¹Separated, divorced, widowed, and never married.

²Black or African American, Hispanic, Asian or Pacific Islander, Native American, and Other.

The economic variables included total annual household income, home-ownership, amount of liquid assets, and eligibility for government health insurance. Income was coded as a categorical variable. Amount of liquid assets was used as a continuous variable and was calculated by summing the amount of money in savings, checking, money market deposit accounts, and call accounts at brokerages. Renter was coded as 1, and homeownership was coded as 0. Government health insurance was coded as 1 if the reply

to the following question was positive: "Are you or anyone in your family living here, including household members with independent finances, currently eligible to receive benefits from any government health insurance programs, such as Medicare, Medicaid, or CHAMPUS, VA (Veterans' Assistance), or other military programs?" We included government health insurance because the receipt of this benefit could be a resource for households when income was cut (2).

Figure 1. Distribution of households answering: "Do you feel it is all right to borrow money to cover living expenses when income is cut?"



The credit-related variables included number of credit cards, payment pattern, and outstanding balance on credit card after the last monthly payments were made. Number of credit cards, coded as a continuous variable, was used as a proxy for experience in using credit. The outstanding balance on credit cards was treated as a continuous variable. Payment pattern was measured by the response to the question, "Now thinking of all the various loan or mortgage payments you made during the last year, were all the payments made the way they were scheduled, or were payments of any of the loans sometimes made later or missed?" The responses were "always pay debt as scheduled, sometimes got behind or missed payments, and inapplicable." The households for whom the question was "inapplicable" were identified as having no payment obligations and were therefore used as the reference group.

The attitudinal variables included the household head's perception of their income for the last year and his or her personal health status. Perception of income measured how the level of income was viewed in relation to what

was expected in a normal year. This variable was coded as 1 if income was lower than expected and 0 if otherwise. Health status was coded as 1 if the household heads reported their health status as fair or poor and 0 if otherwise.

Results

Description of Sample

Slightly less than half (44 percent) of the household heads said it was "all right" to borrow money to cover living expenses when income was cut (fig. 1). The average household size was two people, and the household head had completed almost 13 years of education (table 2). One-fourth of the households were headed by a person younger than 35; three-fourths, by a person who was White; and a little over half, by a person who was married. Sixteen percent of the households had annual household income below \$10,000; 50 percent had household incomes of \$30,000 or more. Over half were homeowners: 57 percent. Slightly more than one-third of the households were eligible for some type of government health insurance: 38 percent.

Households whose heads are younger, non-White, with household income below \$20,000, and who had incurred late debt payments are more likely to borrow money—use credit—to cover living expenses when income is cut.

Table 2. Description of households, 1995 Survey of Consumer Finances¹

Variable	Measurement
	Mean (Median)
Household size	2.38 (2)
Years of education	12.9 (12)
Liquid assets	\$13,258 (\$1,600)
Number of credit cards	1.61 (1)
Credit card balance outstanding	\$1,647 (\$424)
	Percent
Age	
Less than 35	24.8
35 - 44	23.0
45 - 54	17.9
55 and older	34.4
Marital status	
Married	52.5
Not married	47.5
Race	
White	77.6
Non-White	22.4
Household Income	
Less than \$10,000	16.4
\$10,000 - \$19,999	18.6
\$20,000 - \$29,999	14.6
\$30,000 - \$49,999	24.0
\$50,000 or more	26.0
Homeownership	
Homeowners	56.7
Renters	43.3
Government health insurance	
Eligible	37.7
Non-eligible	62.3
Payment pattern	
No payment obligations	35.3
Late payments	16.5
Payment on schedule	48.2
Expectation about income	
Income lower than expected	16.4
Income as high or higher than expected	83.6
Health status	
Fair or poor	24.5
Very good or excellent	75.5

¹N=4,299.

Whereas the average amount of liquid assets was \$13,258, the median was only \$1,600. The average amount of outstanding credit card balance was \$1,647, while the median balance was considerably lower: \$424. On average, households held one to two credit cards. Almost half (48 percent) of the households in the sample reported that they paid their debts on schedule while 17 percent reported being late or missing payment obligations. Thirty-five percent had no payment obligations. One-fourth of the household heads perceived their health status as fair or poor, and over four-fifths reported that their income had been as high or higher than what they expected for a normal year, 25 and 84 percent, respectively.

Predictors of Attitude Toward Use of Credit

The factors that were statistically significant predictors of having a positive attitude toward using credit when income was cut were age, income, being a non-minority, and payment pattern (table 3). The odds that the head of household will borrow to cover living expenses when income is cut increase from 46 to 94 percent for household heads younger than 35 (94 percent), those aged 35 to 44 (57 percent), and 45 to 54 (46 percent), compared with households headed by a person age 55 and over. When the head of household is White, the odds that the head will borrow to cover living expenses when income is cut decrease by 16 percent, compared with a non-White head of household.

The odds that households will borrow when income is cut increased significantly for those with incomes less than \$10,000 and between \$10,000 and \$19,999, compared with households with more than \$50,000 yearly income. The odds that a household with an income less than \$10,000 would borrow money when income was cut increased

Table 3. Results of logistic regression: Attitude toward borrowing when income is cut, 1995 Survey of Consumer Finances¹

Variable	Parameter estimate	P-value	Odds ratio
Age (55+ reference group)			
Less than 35	.6608	.0001***	1.936
35 - 44	.4512	.0001***	1.570
45 - 54	.3795	.0001***	1.462
Married	-.0866	.2540	0.917
White	-.1698	.0481*	0.844
Education	.0115	.3858	1.012
Household size	.0134	.5843	1.013
Household income (\$50,000+ reference group)			
Less than \$10,000	.3890	.0045**	1.475
\$10,000 - \$19,999	.2928	.0159*	1.340
\$20,000 - \$29,999	.0920	.4419	1.096
\$30,000 - \$49,999	.0606	.5110	1.063
Renter	-.0879	.2690	0.916
Liquid assets	-2.41E-8	.3599	1.000
Eligible for government health insurance	.0464	.5588	1.047
Number of credit cards	-.00421	.8239	0.996
Payment pattern (no payment obligation, reference group)			
Payment on schedule	-.0128	.8728	0.987
Late payment	.2725	.0214*	1.288
Credit card balance	.000013	.0829	1.000
Income lower than expected	-.0495	.6380	0.952
Poor health	-.0253	.7693	0.975
Intercept	-.6166	.0132*	
-2 LOG likelihood		5,743.488***	

¹N=4,299.

*P<.05; **P<.01; ***P<.001.

by 48 percent, compared with the household that had a \$50,000 income. The household with income between \$10,000 and \$19,999 increased its odds of borrowing money by 34 percent. When the household is late with payments, the odds increase by 29 percent that the household will borrow money to cover living expenses when income is cut, compared with households with no payment obligations.

Discussion and Implications

Households whose heads are younger, non-White, with household income below \$20,000, and who had incurred

late debt payments are more likely to borrow money—use credit—to cover living expenses when income is cut. These findings support previous studies on general credit use.

Several findings from other studies, however, were not supported in the study. Marital status, liquid assets, level of education, household size, homeownership, eligibility for government health insurance benefits, number of credit cards, and health status were not related significantly to using credit to cover living expenses when income is cut. Although the relationship between outstanding credit card balance and the dependent variable was not significant, it was positive. This suggests that consumers with larger

balances would charge more if their income was cut.

This study provides information about consumers who consider it appropriate to use credit when there are income difficulties. These households appear to be more likely to use credit when they face unemployment or unexpected events such as illness or accidents that affect the level of their household income. A previous study has pointed out that there are different types of borrowers, such as some who borrow for the purpose of social display and others who borrow to cover expenditures on necessities (11). It may be difficult to reach younger, low-income households that are having difficulty paying on time through educational

programs. A type of educational program that is gaining more attention is Personal Finance Employee Education at work (12). The potentially risky households who were identified here are likely to benefit from education provided at the workplace that would help them understand the potential consequences of not paying off debts, finding strategies to reduce debt load, or identifying community and government resources that increase income or reduce expenses. Also, education provided by the Cooperative Extension Service, faith organizations, and other groups would be beneficial (1).

Another technique for helping consumers manage money better is to support the continued implementation of the NEFE⁴ High School Financial Planning Program (14). If high school students learn about budgeting and using credit, the knowledge and skills gained while they are students may be more likely to continue as they enter college and the work force. Another alternative available to consumers is the Neighborhood Financial Care Center (formerly known as Consumer Credit Counseling Services). The Center helps consumers evaluate and pay down their debt.

The finding that having difficulty making payments on time increases the likelihood of borrowing when income is cut is a complex issue. Lenders may have extended credit to people who had good credit histories but who are now having difficulties (because of unemployment or health problems, etc.) repaying their debts. Also, some lenders may have extended credit to more risky consumers, because the lender wanted to increase its customer base. It may be impossible for consumer educators to address this issue, but at the local level, consumer educators can communicate their concerns to business leaders. The findings of this study would also be

helpful for credit card issuers. Young, low-income, non-White, and "late payment" households constitute an especially high-risk consumer because they consider it appropriate to use credit when income is cut, and they may have few economic resources and be employed in less stable jobs (3).

Borrowing to cover living expenses when income is cut should be re-examined in other ways by using information that is not available in the SCF. Work status might be an important predictor of attitudes toward borrowing. Those who are unemployed temporarily, or those who are employed in cyclical occupations, may be more likely to use credit to cover living expenses when income is cut (18). Thus it may be necessary to use data on employment status to understand better which households will encounter this problem. Future attempts to answer the question about the use of credit when income is cut will surely benefit consumers who are most in need of this help.

References

1. Adamson, C.R., Mayer, R.G., and Williams, F.L. 1999. Hispanic financial counseling. *Proceedings of the Association for Financial Counseling and Planning Education*, p. 102.
2. Bird, E.J., Hagstrom, P.A., and Wild, R. 1997. Credit Cards and the Poor. Institute for Research on Poverty. Discussion Paper 1148-97.
3. Black, S.E. and Morgan, D.P. 1999. Meet the new borrowers. *Federal Reserve Bank of New York Current Issues in Economics and Finance* 5(3):1-6.
4. Bloom, D.E. and Steen, T.P. 1987. Living on credit. *American Demographics*, October, pp. 22-29.
5. Brobeck, S. 1992. Consumers' attitudes toward credit cards. *Credit World*, July/August, pp. 8-13.
6. Calem, P.S. and Mester, L.J. 1993. Search, switching costs and the stickiness of credit card interest rates. Working paper number 92 – 24 R. Federal Reserve Bank of Philadelphia, Philadelphia, PA.
7. Canner, G.B. and Cynrak, A.W. 1986. Determinants of consumer credit card usage patterns among U.S. families. *Journal of Retail Banking* VII(3):63-74.
8. Canner, G.B. and Kennickell, A.B. 1995. Household sector borrowing and the burden of debt. *Federal Reserve Bulletin* 81:323-334.
9. Canner, G.B. and Lockett, C.A. 1991. Payment of household debts. *Federal Reserve Bulletin* 77:218-229.
10. Choi, H.N. and DeVaney, S.A. 1996. Differences in the use of bank and retail credit cards in the U.S.A. *Journal of Consumer Studies and Home Economics* 19:381-392.
11. Fan, J.X. 2000. Linking consumer debt and consumer expenditures: Do borrowers spend money differently? *Family and Consumer Sciences Research Journal* 28(3):357-400.
12. Garman, E.T. 1999. Employer-sponsored education programs and incentives to improve employees' financial lifestyles. *Personal Finances and Worker Productivity* 3(2):3-8.
13. Godwin, D.D. 1997. Dynamics of households' income, debt and attitudes toward credit, 1983-1989. *The Journal of Consumer Affairs* 31(2):303-325.
14. Huddleston-Casas, C.A., Danes, S.M., and Boyce, L. 1999. Impact evaluation of a financial literacy program: Evidence for needed policy change. *Consumer Interests Annual* 45:109-114.

-
15. Kennedy, P. 1998. *A Guide to Econometrics* (4th ed.). TJ International, United Kingdom.
16. Kennickell, A.B., Starr-McCluer, M., and Sunden, A.E. 1997. Family finances in the U.S.: Recent evidence from the Survey of Consumer Finances. *Federal Reserve Bulletin* 83(1):1-24.
17. Slocum, J.W. and Mathews, H.L. 1970. Social class and income as indicators of consumer credit behavior. *Journal of Marketing* 34:69-74.
18. Sullivan, T.A., Warren, E., and Westbrook, J.L. 2000. *The Fragile Middle Class: Americans in Debt*. Yale University Press, New Haven, CT.
19. Waldrop, J. 1989. Inside America's households. *American Demographics*, March, pp. 20-27.
20. Wasberg, C.A., Hira, T.K., and Fanslow, A.M. 1992. Credit card usage and consumer debt burden of households. *Journal of Consumer Studies and Home Economics* 16:9-32.
21. Zhu, L.Y. and Meeks, C.B. 1994. Effects of low income families' ability and willingness to use consumer credit on subsequent outstanding credit balances. *The Journal of Consumer Affairs* 28(2):403-422.

Relationships of Substance Abuse to the Nutritional Status of Pregnant African-American Women

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The effect of illicit drug use, which was determined from fasting blood samples, on maternal nutritional status was examined in a study of African-American pregnant women. Participants were classified as drug users, trace drug users, and nondrug users. Quantitative self-reported dietary records and maternal anthropometric measurements were collected. Consumption of protein, vitamin A, ascorbic acid, selected B-complex vitamins, and phosphorus equaled or exceeded 100 percent of the 1989 Recommended Dietary Allowances (RDA) for all groups. Vitamin B₁₂, calcium, folate, iron, magnesium, and zinc were consumed in amounts below 100 percent of the 1989 RDA. Food energy, nutrient intakes, sociodemographic characteristics, maternal anthropometric measurements, and delivery weight were similar among the three groups. The unexpected results of this study may be due to the method used to classify the participants. Thus, more extensive research is needed.

Illicit and nonillicit drug abuse is a major interest of clinicians, public health officials, and social authorities (e.g., child welfare). Moreover, one of the major concerns is drug abuse during the periconceptional period and throughout pregnancy because of its potential adverse effects on the health of the mother, embryo, fetus, and neonate (14,36,37).

Age, race, and socioeconomic status are among the most frequently cited factors associated with low birth weight and preterm delivery. Specifically, being young, being African American, and having a low socioeconomic status are most often associated with adverse pregnancy outcomes (1,11,18,19,32, 39). A higher maternal educational level is associated with better health knowledge and behavior (35).

One to 58 percent of pregnant women use drugs (47). Such wide variations in reported use could be attributed to the voluntary nature and lack of adequate drug-screening techniques, disparate patterns of drug use among different U.S. regions and populations, differences in drug-screening methods, or differences in levels of prenatal care among drug-using populations (27). Lack of agreement exists in the scientific literature regarding the most prevalent illicit drugs used during pregnancy. However, research shows that about 11 percent of pregnant women in the United States use at least one of the following drugs: cocaine, marijuana, heroin, methadone, phencyclidine (PCP), and amphetamines (40). Each year in this country, more than 200,000 infants are exposed *in utero* to one or more illicit drugs (9,45).

Women who abuse illicit drugs and alcohol during pregnancy are an elusive population. These women often remain unidentified to practitioners and researchers and therefore have not been studied to a great extent (22). Despite the even distribution of illicit substance use across demographic categories, poor women and women of color are far more likely than are other women to be reported to health and child welfare authorities for use of substances during pregnancy, even when their base rates for use of illicit drugs are considered (22).

Little information is available on the nutritional consequences of substance abuse during pregnancy, and the available studies of women who have used nonillicit as well as illicit drugs during pregnancy have provided conflicting results regarding the nutritional effect on users (26,30). Some evidence shows that cocaine acts as an appetite suppressant (52). Another shows increased caloric intake and low levels of plasma zinc among marijuana users (29). Researchers estimate that nearly 50 percent of opiate-dependent women suffered from anemia, heart disease, diabetes, pneumonia, or hepatitis during pregnancy and childbirth (52).

Another study shows that women who consumed alcohol during pregnancy drank more frequently before pregnancy than did women who drank alcohol prenatally but not during pregnancy (33). Jacobson and others (25) also found that many mothers reported higher levels of alcohol consumption before pregnancy than during pregnancy. One plausible interpretation is that the mothers underreported their actual levels of drinking when they were interviewed at prenatal clinics because of the stigma associated with drinking during pregnancy. This may be especially likely when women are interviewed

in a prenatal clinic where the health and welfare of the infant is focal. Alternatively, self-reported alcohol consumption by pregnant women may be influenced by their current level of drinking, which is typically higher.

Excessive alcohol consumption impairs the metabolism of most nutrients. Ethanol intake also leads to negative nitrogen balance and an increased protein turnover (8,52). However, evidence concerning the adverse effects of alcohol on specific nutritional indices comes mainly from studies of nonpregnant, hospitalized alcoholics; few data are available on the effect of alcohol on maternal nutrition (52). Information is particularly sparse on the diets of pregnant women of African descent and almost nonexistent for pregnant women who are substance abusers. In one study, maternal and umbilical cord blood zinc levels were lower in pregnant women who consumed alcohol than in those who did not (16). Another study suggested that alcohol may impair placental transport of amino acids (15).

Another behavior—cigarette smoking—may affect maternal nutrition by decreasing the availability of calories and certain nutrients such as vitamin B₁₂, amino acids, folate, and zinc (52). Efforts to improve maternal and fetal nutrition during pregnancy have focused on achieving appropriate energy intakes and ensuring that the intake of specific nutrients is adequate to meet maternal and fetal requirements (52).

Despite researchers' efforts in recent years to document the consequence of maternal substance abuse on pregnancy outcomes, information on specific maternal consequences of substance abuse during pregnancy is sparse. Thus this study focused on the relationships of nonillicit (alcohol and tobacco) and illicit (cocaine, marijuana, heroin, PCP,

and opiates) substance abuse to the nutritional status of pregnant African-American women residing in an urban environment.

Methods

Research Design and Study Participants

A prospective research design was used in the study. Participants were recruited prior to the twenty-eighth week of gestation and followed until the birth of their child. The study participants were 163 African-American pregnant women who were ages 16 to 35 and had no previous pregnancies that continued beyond 28 weeks. Subjects were free of diabetes mellitus and abnormal hemoglobins (sickle cell disease, thalassemia, and hemoglobin C). They were recruited from prenatal clinics operated by two urban hospitals and the Department of Health and Human Services (DHHS).

Data Collection

On entry into the study, participants were interviewed by trained personnel who collected sociodemographic data (age, marital status, educational level attained, and annual household income). Quantitative dietary data were collected monthly by using the 24-hour dietary recall method. Participants were recruited at various stages of their pregnancy; thus, the number of recalls varied from 1 to 7 days, with a mean of 2.6 days. We used three-dimensional food models and various measuring implements (measuring cups, spoons, etc.) to help participants recall how much foods and beverages were consumed the previous day. The Nutriplanner 6,000 System was used to calculate food and nutrient intake data (42).

The use of illicit and nonillicit drugs was determined by self-reports and

biochemical analyses. After recruitment into the study, the women were asked whether they had used alcohol, cocaine, marijuana, heroin, opium, or PCP before and during pregnancy. Fasting venous blood samples were collected from the participants during each trimester: 1-13 weeks, 14-26 weeks, and 27 or more weeks. The prevalence of self-reported drug use before and during pregnancy was compared with the biochemical determination of drug use. Weeks of gestation at birth were established (10).

Analyses for cocaine, marijuana, opium, or PCP were conducted on aliquots of serum collected from clotted blood samples that had been stored at -80°C. Participants' anthropometric measurements—pre-pregnancy weight (self-reported), maternal height, pregnancy weight gain, and delivery weight (based on measurements)—were obtained from their medical records. The initial semiquantitative testing of serum samples for illicit drug abuse was conducted by using the immune technique that is direct, automated, and enzyme-mediated (48).

The classification of participants as drug users, trace drug users, or nondrug users was derived by using standards established by the Alcohol, Drug Abuse, and Mental Health Administration/National Institutes of Health Administration on Drug Abuse (13). Women were classified as drug users ($n=19$) when their serum threshold levels were at least 300 ng/ml for cocaine, 100 ng/ml for marijuana, 300 ng/ml for opiates, or 25 ng/ml for PCP. Women were classified as trace drug users ($n=122$) when their sera tested positive for cocaine, marijuana, opiates, or PCP, but concentration levels were below the serum threshold levels for this group. Participants were classified as nondrug users ($n=22$) when their sera showed no evidence of cocaine, marijuana, opiates, or PCP.

Statistical Methods

Chi-square tests were used to compare sociodemographic characteristics, patterns of drug usage, and dietary practices of pregnant African-American women who were drug users, trace drug users, or nondrug users. Analysis of variance (ANOVA) and Duncan's multiple range t tests were used to investigate the relationships of substance abuse to dietary intakes and anthropometric measurements among the three groups of women. The computer Statistical Package for the Social Sciences (SPSS[®]) was used to analyze the data (50).

Results

Sociodemographic Characteristics and Self-Reported Drug Use

The pregnant African-American women were ages 16 to 35; most in each group were age 21 or younger: 58 to 68 percent (table 1). Most of the pregnant women were single (86 to 95 percent) and had at least a high school education (63 to 77 percent). Thirty-two to 53 percent of the women had an annual household income that was less than \$23,000.

More than 25 percent of the pregnant women reported using illicit drugs before pregnancy; this number was more than eight times greater than the percentage of pregnant women reporting drug use during pregnancy (table 2). The most commonly abused drug reported both before and during pregnancy was marijuana, followed by cocaine. When interviewed, almost 97 percent of the pregnant women denied using drugs during pregnancy. However, biochemical determination of drug use showed that 88 percent of the pregnant women were classified as drug users or trace users.

The most commonly abused drug reported both before and during pregnancy was marijuana, followed by cocaine.

Table 1. Sociodemographic characteristics of pregnant African-American women

	Group 1 drug users	Group 2 trace drug users	Group 3 nondrug users
Participants (number)	19	122	22
	Percent		
Age groups (years)			
16-18	21.1	21.3	22.7
19-21	36.8	41.8	45.6
22-24	21.1	18.0	13.6
25-27	15.7	10.7	4.5
28-35	5.3	8.2	13.6
Marital status			
Single	94.7	87.0	86.4
Married	0	9.8	13.6
Other ¹	5.3	1.6	0
Not reported	0	1.6	0
Highest level of education attained			
Elementary school	0	0.8	0
Some high school	26.3	27.1	22.7
High school graduate	47.4	38.5	45.5
Trade school	0	5.7	9.1
College ²	15.7	18.9	22.7
Other	5.3	0.8	0
Not reported	5.3	8.2	0
Annual household income			
<\$11,000	15.7	29.5	13.6
\$11,000 - \$22,999	31.6	23.0	18.2
\$23,000 - \$34,999	15.8	9.0	13.6
≥\$35,000	5.3	7.4	18.2
Not reported	31.6	31.1	36.4

¹Separated, divorced, or cohabitating.

²One semester or more of college credits.

Sociodemographic characteristics among the three groups were not significantly different ($p > 0.05$).

Note: Biochemical assays were used to classify the three groups.

Among the two nonillicit drugs studied, cigarettes, compared with alcohol, were more likely to be used. Eighteen percent of pregnant women reported smoking cigarettes during pregnancy; most smoked 1 to 5 cigarettes per day. Four percent of the participants reported consuming alcohol during pregnancy, with regular beer being the most popular alcoholic beverage consumed (fig. 1). Chi-square analysis revealed no significant relationship between drug use and smoking or between drug use and consumption of alcoholic beverages. However, chi-square analysis did show a significant relationship between smoking and the use of alcoholic beverages ($p < 0.05$). This finding indicated that those who smoked were more likely to use alcoholic beverages (data not shown).

Energy and Nutrient Intakes Compared With Recommended Levels

In contrast to *a priori* expectations, we found that the women who were classified as drug users had a mean energy intake that exceeded 100 percent of the 1989 recommended energy allowances: 101.1 percent (41) (table 3). The other groups of women had total kilocalorie intakes of less than 100 percent of these recommendations: 91 to 94 percent. The three groups of pregnant women had mean intakes of protein, ascorbic acid, thiamin, riboflavin, niacin, vitamin B₁₂, and phosphorus that met or exceeded 100 percent of the RDAs (table 4). For ascorbic acid and vitamin B₁₂, the intakes exceeded 200 percent of the RDAs: 211 to 259 percent. On the other hand, intakes of vitamin B₆, folate, calcium, iron, magnesium, and zinc were less than 100 percent of the RDAs: 26 to 82 percent. Drug users and trace drug users had mean intakes that exceeded 100 percent of the RDAs for vitamin A (127 to 151 percent), but

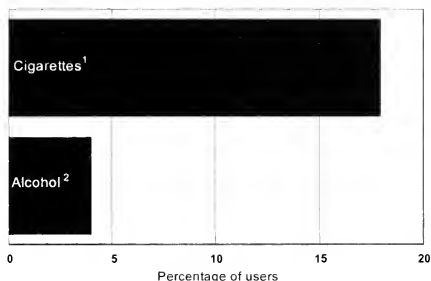
Table 2. Prevalence of self-reported drug use of African-American women before and during pregnancy

Self-reported drug use	Group 1 drug users	Group 2 trace drug users	Group 3 nondrug users
Participants (number)	19	122	22
	Percent		
Before pregnancy			
Marijuana	15.8	13.1	27.3
Cocaine, heroin, or PCP	10.6	13.0	0
During pregnancy			
Marijuana	0	1.6	4.5
Cocaine, heroin, or PCP	0	1.6	0

Self-reported drug use among the three groups was not significantly different ($p > 0.05$).

Note: Same individuals used more than one drug; therefore, percentages do not total 100.

Figure 1. Use of selected nonillicit drugs by African-American women during pregnancy



¹Most smoked 1 to 5 cigarettes per day.

²Beer was the most popular alcoholic beverage.

nondrug users had vitamin A intakes below 100 percent of the RDAs (84 percent). However, the adequacy of food energy and nutrient intakes among the groups was not statistically significant.

Anthropometric Measurements

The anthropometric measurements were similar among the three groups of pregnant African-American women (table 5). For most of the measurements—pre-pregnancy weight, percentage of ideal pre-pregnancy body weight, body mass index (BMI), and delivery weight—the means were highest for drug users, compared with trace drug users and nondrug users. The differences, however, were not statistically significant.

Discussion and Conclusion

When the sociodemographic characteristics among three groups of pregnant African-American women were compared, no significant differences were noted. These findings were comparable to those reported in other studies that focused on the epidemiology of illicit substance abuse and nonillicit drug use. Similar studies depicted sociodemographic data that both confirmed (17,33,36,51) and contradicted (2,46) the findings in this study.

Our study showed that marijuana was the predominant drug of abuse, followed by cocaine. The pattern of illicit self-reported drug use in our study was similar to the self-reported pattern of drug use reported by others who found that marijuana and cocaine were more likely to be used, compared

with opiates (4,17,25). It was not surprising that the prevalence of drug use that is based on self-reports was lower than the prevalence that is based on biochemical assays. The low prevalence of marijuana and cocaine use reported in this study may be due to the stigma associated with drug use, especially during pregnancy, as well as due to the fear of prosecution. When the participants in our study were interviewed, they reported a higher prevalence of substance abuse before pregnancy. This finding, which is confirmed by biochemical determination, is consistent with results of similar studies that showed women had been underreporting their use of illicit drugs when the interviews occurred during their pregnancies (23,25). However, women may be more willing to disclose retrospectively information regarding illicit drug use during pregnancy when it is less likely they will be referred for treatment, threatened with loss of custody of their babies, or prosecuted (23). Further, although self-reported data are often described as being inherently unreliable, the accuracy of self-reports vary considerably depending on the substance, time of the interview, skill of the interviewer, and other factors (25).

One participant, determined by biochemical assays to be a nondrug user, admitted to being a current drug user. It is unlikely that a person would admit to being a current drug user when she is a nondrug user. Thus it is possible there is a flaw in the biochemical determination used in this study to determine current drug use. Current immunoassay methods and their routine threshold levels may not be sensitive enough to detect serum cocaine, marijuana, heroin, or PCP in pregnant women. Also, someone who tested negative for serum illicit drugs on a given day may be a heavy drug user who may have abstained from substance abuse for

Table 3. Energy intakes of pregnant African-American women, compared with the 1989 recommended energy allowances

	Group 1 drug users	Group 2 trace drug users	Group 3 nondrug users
Participants (number)	19	122	22
Total energy intake (kcal)	2527.0 ± 170.9	2347.0 ± 70.9	2270.8 ± 132.5
1989 Recommended Energy Allowances (%)	101.1	93.9	90.8

Energy intakes among the three groups were not significantly different ($p>0.05$).
Note: Biochemical assays were used to classify the three groups.

Table 4. Nutrient intakes of pregnant African-American women, as percentages of the 1989 Recommended Dietary Allowances

	Group 1 drug users	Group 2 trace drug users	Group 3 nondrug users
Participants (number)	19	122	22
	Percent RDA		
Protein	176.7	160.7	163.3
Vitamin A	150.6	126.6	84.3
Ascorbic acid	238.2	210.6	226.3
Thiamin	126.7	115.8	99.5
Riboflavin	144.1	139.6	118.4
Niacin	139.0	135.2	127.2
Vitamin B ₆	71.6	80.5	60.5
Folate	58.4	63.3	46.5
Vitamin B ₁₂	259.0	254.1	251.8
Calcium	40.2	32.5	25.5
Phosphorus	131.5	112.0	103.7
Iron	50.8	52.5	44.9
Magnesium	81.7	75.2	62.8
Zinc	76.8	69.2	60.7

Nutrient intakes among the three groups were not significantly different ($p>0.05$).
Note: Biochemical assays were used to classify the three groups.

Table 5. Maternal anthropometric measurements of pregnant African-American women

Anthropometric measurements	Group 1 drug users	Group 2 trace drug users	Group 3 nondrug users
Participants (number)	19	122	22
	<i>Mean ± standard error</i>		
Height (in.)	63.8 ± 0.6	64.4 ± 0.3	63.5 ± 0.6
Pre-pregnancy weight (lbs.)	144.3 ± 8.7	139.5 ± 3.0	138.4 ± 5.4
Ideal body weight (%)	120.3 ± 6.9	114.2 ± 2.3	117.4 ± 5.4
Body mass index (BMI) (kg/m ²)	24.9 ± 1.4	23.7 ± 0.5	24.4 ± 1.2
Weekly weight gain (lbs.)	0.7 ± 0.1	0.7 ± 0.04	0.6 ± 0.08
Total weight gain (lbs.)	30.0 ± 4.6	31.1 ± 2.4	24.7 ± 2.8
Delivery weight (lbs.)	173.0 ± 9.0	170.7 ± 3.8	164.4 ± 7.1

Maternal anthropometric measurements among the three groups were not significantly different ($p > 0.05$).

Note: Biochemical assays were used to classify the three groups.

Among the two nonillicit drugs studied, cigarettes, compared with alcohol, were more likely to be used.

several days preceding the drug test. Thus a negative drug test will be read. In addition, lack of agreement between self-reports and biochemical determination of illicit drug use could be partly due to the relatively short half-life of most of these illicit drugs. The half-life of cocaine in the plasma after oral ingestion or inhalation is 1 hour. For marijuana, plasma concentration peaks within 7 to 10 minutes; physiological effects are shown between 20 and 30 minutes. The half-life of PCP appears to be about 3 days, but it could be shortened to 1 day by gastric suction and acidation of urine (21).

Our finding that participants who smoked cigarettes were more likely to consume alcoholic beverages, compared with those who did not smoke, is consistent with results of similar studies (3,20,25,56). Other studies showed that women who drank alcohol during pregnancy were more likely to smoke

cigarettes and use illicit drugs, to have parents who drank alcohol, or to feel that other pregnant women drank similar amounts of alcohol (25).

The energy intakes of participants in our study, as a percentage of the recommended energy allowances (41), were higher than those recorded by other investigators (7,12,44). In a similar study, researchers found that women reporting drug use before pregnancy had significantly higher intakes of food energy than did their counterparts who were using drugs during pregnancy (27). The protein intakes of the participants in our study exceeded 161 percent of the RDA and are consistent with those of other studies (7,49). Another study, however, reported protein intakes of less than 100 percent of the RDA for the pregnant participants who used illicit drugs (12).

Other studies (24,34,49) also supported our findings of relatively high intakes of vitamin A among pregnant participants. The 1989 RDA for ascorbic acid for pregnant women is 70 mg (41). Overall, our findings regarding the intakes of the selected B vitamins (thiamin, riboflavin, niacin, and B₁₂) are supported by other studies that consistently reported intakes of selected B-complex vitamins as being at least 100 percent of the RDAs (12,49). Vitamin B₆ intakes of our study participants did not meet the 1989 RDAs for all three groups of women, a finding supported by other studies (12,49). Women in our study consumed folate in amounts substantially less than the RDA. Several studies that reported average nutrient intakes by pregnant women, compared with the RDAs, recorded mean folate intakes below the RDA (12,24).

Calcium, iron, magnesium, and zinc intakes for all three groups of women in our study were less than 83 percent of the 1989 RDAs. Other studies had similar findings (7,12,24,49,53). In our study, phosphorus was the only mineral that exceeded 100 percent of the 1989 RDA.

Some of the food composition databases lacked information on nutrients that may be present in the diets of pregnant women at levels that are substantially less than recommended. These nutrients include vitamins B₆, B₁₂, D, and E, and some minerals (including zinc, magnesium, and copper) (41). This may explain partially why the aforementioned nutrients are among those that are reported to be consumed consistently in amounts substantially less than the RDAs.

In our study, body mass index (BMI) values were considered normal—according to the guidelines that consider BMI values between 18.5 and 24.9 as normal (38). BMI is a

preferred indicator of nutritional status because it depends on two commonly and easily measured aspects of morphology—weight and height (52).

A large study of 3,946 White non-Hispanic mothers reported BMI values up to 26 (28). Similarly, another study depicted a wider range of BMIs from underweight to obese for their pregnant participants (43). Pregnancy guidelines recommend that women of normal pre-pregnancy weight should gain between 25 and 35 pounds, while underweight and overweight women should gain between 35 and 40 and 15 and 25 pounds, respectively (31). The mean gestational weight gains of the participants in our study were within the normal ranges. Other investigators reported similar mean gestational weight gains for their participants (5,26,54,55).

Pre-pregnancy weight-for-height status is among factors that investigators have linked with gestational weight gain (52). Weights determined at the first prenatal visit during the first trimester of pregnancy have been used to estimate total weight gain and early gestational weight gain, but these weights do not necessarily reflect pregnancy weights. Although average weight gain in the first trimester is small relative to that in the second and third trimesters, individual variation may be considerable. Total gestational weight gains may be overestimated by self-reports or underestimated if based on weight in the latter part of the first trimester (52). The Subcommittee on Nutritional Status and Weight Gain During Pregnancy suggests that African-American women should strive to gain weight at the upper end of the target weight range (52).

Compared with their counterparts, women addicted to recreational drugs are at a higher risk of experiencing a variety of obstetrical complications that

may increase perinatal morbidity for mother and child (6). Preventing these effects should be based on thorough information about this segment of the population—probably via unbiased longitudinal studies. Prevention of these deleterious effects should also be based on careful medical control of the nutrition of these mothers, their health and social conditions during gestation, and the treatment of their addiction before and during pregnancy (36).

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References

1. Abrams, B. and Newman, V. 1991. Small-for-gestational-age birth: Maternal predictors and comparison with risk factors of spontaneous pre-term delivery in the same cohort. *American Journal of Obstetrics and Gynecology* 164:785-790.
2. Adams, E.H., Gfroerer, J.C., and Rouse, B.A. 1989. Epidemiology of substance abuse including alcohol and cigarette smoking. *Annals of the New York Academy of Sciences* 562:14-22.
3. Archie, C.L., Anderson, M.M., and Gruber, E.L. 1997. Positive smoking history as a preliminary screening device for substance use in pregnant adolescents. *Journal of Pediatrics Adolescence and Gynecology* 10(1):13-17.
4. Bendich, A. 1993. Lifestyles and environmental factors that can adversely affect maternal nutritional status and pregnancy outcomes. In C.L. Keen, A. Bendich, and C.C. Willhite (Eds.) *Maternal Nutrition and Pregnancy Outcome. Annals of the New York Academy of Sciences* 678:255-265.
5. Bergmann, M.M., Flagg, E.W., Miracle-McMahill, H.L., and Boeing, H. 1997. Energy intake and net weight gain in pregnant women according to body mass index. *International Journal of Obstetrics and Related Metabolic Disorders* 21(11):1010-1017.
6. Bishai, R. and Koren, G. 1999. Maternal and obstetric effects of prenatal drug exposure. *Clinical Perinatology* 26(1):75-86.
7. Brennan, R.E., Kohrs, M.B., Nordstrom, J.W., Sauvage, J.P., and Shank, R.E. 1983. Nutrient intakes of low income pregnant women: Laboratory analysis of foods consumed. *Journal of the American Dietetic Association* 83:546-550.
8. Bunout, D. 1999. Nutritional and metabolic effects of alcoholism: Their relationship with alcoholic liver disease. *Nutrition* 15(7-8):583-589.
9. Butz, A.M., Lears, M.K., O'Neil, S., and Lukk, P. 1998. Home interventions for *in utero* drug-exposed infants. *Public Health Nursing* 15(5):307-318.
10. Dubowitz, L.M.S., Dubowitz, V., and Golberg, C. 1970. Clinical assessment of gestational age in the newborn infant. *Journal of Pediatrics* 77:1-10.
11. Eisner, V., Brazie, J.V., Pratt, M.W., and Hexter, A.C. 1979. The risk of low birthweight. *American Journal of Public Health* 69:887-893.
12. Endres, J., Dunning, S., Poon, S.W., Welch, P., and Duncan, H. 1987. Older pregnant women and adolescents: Nutrition data after enrollment in WIC. *Journal of the American Dietetic Association* 87:1011-1016, 1019.
13. *Federal Register*; Part XII, Friday, August 14, 1987.
14. Fenton, L., McLaren, M., Wilson, A., Anderson, D., and Curry, S. 1993. Prevalence of maternal drug use near time of delivery. *Connecticut Medicine* 57(10):655-659.

-
15. Fisher, S.E., Atkinson, M., Van Thiel, D.H., Rosenblum, E., David, R., and Holzman, I. 1981. Selective fetal malnutrition: The effect of ethanol and acetaldehyde upon *in vitro* uptake of alpha amino isobutyric acid by human placenta. *Life Science* 29:1283-1288.
16. Flynn, A., Miller, S.I., Martier, S.S., Golden, N.L., Sokol, R.J., and Del Villano, B.C. 1981. Zinc status of pregnant alcoholic women: A determinant of fetal outcome. *Lancet* 1:572-575.
17. Frank, A., Zuckerman, B.S., Amaro, H., Aboagye, K., Bauchner, H., Fried, C.L., Hingson, R., Kayne, H., Levenson, S.M., Parker, S., Reece, H., and Vinci, R. 1988. Cocaine use during pregnancy: Prevalence and correlates. *Pediatrics* 82:888-895.
18. Frederick, J. and Adelstein, P. 1987. Factors associated with low birth weight of infants delivered at term. *British Journal of Obstetrics and Gynecology* 85:1-7.
19. Frederick, J. and Anderson, A.B.M. 1976. Factors associated with spontaneous pre-term birth. *British Journal of Obstetrics and Gynecology* 83:342-350.
20. Fried, P.A., Innes, K.S., and Barnes, M.V. 1984. Soft drug use prior to and during pregnancy: A comparison of samples over a four-year period. *Drug and Alcohol Dependence* 13:161-176.
21. Goodman, L.S. and Gilman, A.G. 1982. *Goodman & Gilman's: The Pharmacological Basis of Therapeutics* (7th ed, pp. 560-566). Institute of Medicine, Washington, DC. National Academy of Sciences.
22. Hans, S.L. 1999. Demographic and psychosocial characteristics of substance-abusing pregnant women. *Clinical Perinatology* 26(1):55-74.
23. Hingson, R., Zuckerman, B., Amaro, H., Frank, D.A., Kayne, H., Sorenson, J.R., Mitchell, J., Parker, S., Morelock, S., and Tim, P.R. 1986. Maternal marijuana use and neonatal outcome: Uncertainty posed by self-reports. *American Journal of Public Health* 76:667-669.
24. Hunt, I.F., Murphy, N.J., Cleaver, A.E., Faraji, B., Swendseid, M.E., Coulson, A.H., Clark, V.A., Laine, N., Davis, C.A., and Smith Jr., J.C. 1983. Zinc supplementation during pregnancy: Zinc concentration of serum and hair from low income women of Mexican descent. *American Journal of Clinical Nutrition* 37:572-582.
25. Jacobson, S.W., Jacobson, J.L., Sokol, R.J., Martier, S.S., Ager, J.W., and Kaplan, M.G. 1991. Maternal recall of alcohol, cocaine, and marijuana use during pregnancy. *Neurotoxicology and Teratology* 13(5):535-540.
26. Johnson, A.A., Knight, E.M., Edwards, C.H., Oyemade, U.J., Cole, O.J., Westney, O.E., Westney, L.S., Laryea, H., and Jones, S. 1994. Dietary intakes, anthropometric measurements and pregnancy outcomes. *The Journal of Nutrition* 124(6S):936S-942S.

-
27. Johnson, A.A., Knight, E.M., Edwards, C.H., Oyemade, U.J., Cole, O.J., Westney, O.E., Westney, L.S., Laryea, H., and Jones, S. 1994. Selected lifestyle practices in urban African-American women: Relationship to pregnancy outcome, dietary intakes and anthropometric measurements. *The Journal of Nutrition* 124:963S-972S.
28. Kleinman, J.C. 1990. Maternal weight gain during pregnancy: Determinants and consequences. NCHS working paper series no. 33. National Center for Health Statistics, Public Health Service, U.S. Department of Health and Human Services, Hyattsville, MD, 24 pp.
29. Knight, E.M., Hutchinson, J., Edwards, C.H., Spurlock, B.G., Oyemade, U.J., Johnson, A.A., West, L.W., Cole, O.J., Westney, L.S., Westney, O.E., Manning, M., Laryea, H., and Jones, S. 1994. Relationships of serum illicit drug concentrations during pregnancy to maternal nutritional status. *The Journal of Nutrition* 124(6S):973S-980S.
30. Knight, E.M., Johnson, A.A., Spurlock, B.G., West, W.L., and James, H. 1992. Illicit drug use in pregnancy: Effect of maternal nutritional status and birthweight. *Federation of American Societies for Experimental Biology (Abstract)*.
31. Kolasa, K.M. and Weismiller, D.G. 1997. Nutrition during pregnancy. *American Family Physician* 56:205-212.
32. Kramer, M.S. 1987. Intrauterine growth and gestational duration determinants. *Pediatrics* 80:502-511.
33. Kvigne, V.L., Bull, L.B., Welty, T.K., Leonardson, G.R., and Lacina, L. 1998. Relationship of prenatal alcohol use with maternal and prenatal factors in American Indian women. *Social Biology* 45(3-4):214-222.
34. Loris, P., Dewey, K.G., and Poirier-Brode, K. 1985. Weight gain and dietary intake of pregnant teenagers. *Journal of the American Dietetic Association* 85:1296-1305.
35. Luke, B., Johnson, T.R.B., and Petrie, R.H. 1993. Maternal-sociodemographic characteristics. In *Clinical Maternal-Fetal Nutrition* (pp. 87-120). Little, Brown and Company, Boston.
36. Martinez-Frias, M.L. 1999. A risk analysis of congenital defects due to drug intake during pregnancy. Spanish Collaborative Study of Congenital Malformations. *Medical Clinics* 23;112(2):41-44.
37. Moore, C., Negrusz, A., and Lewis, D. 1998. Determination of drugs of abuse in meconium. *Journal of Chromatography B Biomedical Sciences and Applications* 713(1):137-146.
38. National Heart, Lung and Blood Institute, National Institutes of Health. 1998. *The Evidence Report: Clinical Guidelines on the Identification, Evaluation, and Treatment of Overweight and Obesity in Adults*. U.S. Department of Health and Human Services, Public Health Service, NIH, Publication No.: 98-4083.

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39. National Institute on Drug Abuse (NIDA). *NIDA Capsules*. 1986 (November). Rockville, MD.
40. National Institute On Drug Abuse (NIDA). *NIDA Capsules*. 1989 (June). Drug Abuse and Pregnancy. DHHS Pub. No. (ADM) 91-1804.
41. National Research Council, National Academy of Sciences, Food and Nutrition Board. 1989. *Recommended Dietary Allowances* (10th ed.). National Academy Press, Washington, DC. 284 pp.
42. Nutriplanner 6.000 System. 1987. Practorcare Inc., San Diego, CA.
43. Ogunyemi, D., Hullett, S., Leeper, J., and Risk, A. 1998. Prepregnancy body mass index, weight gain during pregnancy and perinatal outcome in a rural black population. *Journal of Maternal and Fetal Medicine* 7(4):190-193.
44. Papoz, L., Eschwege, E., Pequignot, G., Barrat, J., and Schwartz, D. 1982. Maternal smoking and birth weight in relation to dietary habits. *American Journal of Obstetrics and Gynecology* 142:870-876.
45. Pegues, D.A., Engelgau, M.M., and Woernle, C.H. 1994. Prevalence of illicit drugs detected in the urine of women of childbearing age in Alabama public health clinics. *Public Health Reports* 109(4):530-538.
46. Richardson, G.A., Day, N.L., and McGauhey, P.J. 1993. The impact of prenatal marijuana and cocaine use on the infant and child. *Clinical Obstetrics and Gynecology* 36(2):302-318.
47. Robins, L.N. and Mills, J.L. (Eds.). 1993. Effects of *in utero* exposure to street drugs. *American Journal of Public Health* 83:1S-32S.
48. Rubenstein, K.E., Schneider, R.S., and Ullman, E.F. 1972. Homogenous enzyme immunoassay: A new immunochemical technique. *Biochemical and Biophysical Research Communications* 47:846-851.
49. Rush, D., Sloan, N.L., Leighton, J., Alvir, J.M., Horowitz, D.G., Seaver, W.B., Garbowski, G.C., Johnson, S.S., Kulka, R.A., Holt, M., Devore, J.W., Lynch, J.T., Woodside, M.B., and Shanklin, D.S. 1988. The National WIC Evaluation: Evaluation of the Special Supplemental Food Program for Women, Infants, and Children V. Longitudinal study of pregnant women. *American Journal of Clinical Nutrition* 48:439-483.
50. SPSS Inc. 1990. SPSS® User's Guide. SPSS Inc., Chicago.
51. Stewart, D.E. and Streiner, D. 1994. Alcohol drinking in pregnancy. *General Hospital Psychiatry* 16(6):406-412.

52. Subcommittee on Nutritional Status and Weight Gain During Pregnancy, Subcommittee on Dietary Intake and Nutrient Supplements During Pregnancy, Committee on Nutritional Status During Pregnancy and Lactation; Food and Nutrition Board, Institute of Medicine, National Academy of Sciences. Substance Use and Abuse During Pregnancy. 1990. In *Nutrition During Pregnancy*. Part 1. Weight Gain. Part 2. Nutrient Supplements. National Academy Press, Washington, DC. pp. 63-95, 96-120, 390-411.

53. Sutor, C.J.W., Gardner, J., and Willett, W.C. 1989. A comparison of food frequency and diet recall methods in studies of nutrient intake of low income pregnant women. *Journal of the American Dietetic Association* 89:1786-1794.

54. To, W.W. and Cheung, W. 1998. The relationship between weight in pregnancy, birth-weight and postpartum weight retention. *Australian New Zealand Journal of Obstetrics and Gynaecology* 38(2):176-179.

55. Tulman, L., Morin, K.H., and Fawcett, J. 1998. Prepregnant weight and weight gain during pregnancy: Relationship to functional status, symptoms, and energy. *Journal of Obstetrics, Gynecology, and Neonatal Nursing* 27(6):629-634.

56. Vaughn, A.J, Carzoli, R.P., Sanchez-Ramos, L., Murphy, S., Khan, N., and Chiu, T. 1993. Community-wide estimation of illicit drug use in delivering women: Prevalence, demographics, and associated risk factors. *Obstetrics and Gynecology* 82(1):92-96.

Influences on Fruit and Vegetable Procurement and Consumption Among Urban African-American Public Housing Residents, and Potential Strategies for Intervention

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Epidemiological evidence suggests that diets high in fruits and vegetables provide protective effects from numerous diseases. Data show that consumption of fruits and vegetables is much lower in low socioeconomic groups. This study assessed the food-purchasing behaviors and barriers to consuming fruits and vegetables among African-American women living in public housing in an urban city. Face-to-face data collection methods included interviews of two focus groups of 10 women each and structured-questionnaire interviews of 230 women. The focus groups addressed the issues of barriers to fruit and vegetable consumption by the families; the structured-questionnaire interviews focused on food-purchasing and food-preparation behaviors. Results indicated that the women wanted to increase fruit and vegetable consumption by their family, but several barriers existed: Cost, poor cooking skills, lack of social support, and childhood eating patterns. The women made several key suggestions for interventions: Stipends for participants, pictures to illustrate text, older community members to serve as session leaders, and empathetic and noncondescending teaching styles.

Diets high in fruits and vegetables have been shown to protect against an array of diseases, cancer included (24,25). Carotenoids and vitamin C protect against cataracts (26) and oxidation of cholesterol in the arteries (9). Increased consumption of fruits and vegetables has been shown to reduce elevated blood pressure levels (1), and also to increase significantly iron absorption, thus minimizing iron deficiency anemia (10,31).

Both ethnicity and socioeconomic resources have been linked to variations in the consumption of fruits and vegetables. Consumption of fruits

and vegetables is lower among low-income populations than among their counterparts (15,27). Additionally, the intake of fruits and vegetables is generally lower among African Americans than among Whites (11,16,19).

Various factors affect consumption of fruits and vegetables by low-income families. Intervention approaches must consider barriers to purchase, preparation, and consumption as separate yet interconnected issues. Although removing barriers to the purchase and preparation of fruits and vegetables is a necessary first step, barriers to consumption must also be addressed.

For example, low-income shoppers may be reluctant to risk scarce dollars on foods that are unlikely to be consumed by their families. Moreover, food patterns of African Americans vary according to economic, regional, and social influences of each community. Mainstays of African-American food patterns have drawn on eating habits of several cultures: that of seventeenth and eighteenth century West Africans, culture associated with American Slavery, and the culture of the post-Civil War rural South (3,4,13).

One focus group identified cost, limited storage space, time involved in preparing food, and difficulty in changing one's own and children's behavior as major barriers among low-income White women who lived in housing projects (21). Some of the barriers to consuming fruits and vegetables among low-income women who participated in the Special Supplemental Nutrition Program for Women, Infants and Children (WIC) were unavailability, time and effort to prepare the foods, and preferences for other foods (28).

One limitation of existing work in this area is that data are often collected from respondents who do not live within the same community; hence, shopping experiences could differ. Also, an overemphasis on data collection with participants in programs such as WIC limits our knowledge to families with very young children.

This study attempts to overcome these issues by focusing on women in a wide age range, all living in one specific community (23). Therefore, this explanatory study assessed food-purchasing behaviors of public housing residents in one specific area in an urban city and the barriers they encountered to consuming fruits and vegetables.

Methods

Data Collection and Sample

For this exploratory research, we were interested in both the frequency and patterns of behaviors: such as shopping, meal planning, and food consumption, as well as attitudes and beliefs about foods and dietary practices. The use of two complementary methods of data collection, focus group interviews and more structured questionnaire interviews, allows for both qualitative and quantitative measurement and analyses. From the questionnaire interview data, we could determine the prevalence of certain food behaviors and which groups within our low-income population were most likely to practice these behaviors. From the more qualitative focus group discussions, we could gain insight into the beliefs and attitudes associated with the reported behaviors. The use of multiple methods of data collection, such as those we used, provides triangulation and strengthens the external validity of our findings (2). These findings are crucial in developing targeted and tailored interventions.

Structured Interviews

We conducted surveys in late 1997 to assess the food-purchasing behavior of public housing residents in one area of an urban city. The food-purchasing behavior questionnaire consisted of 22 questions and included:

- Sociodemographic information (age, education, employment, and number of years lived in public housing).
- Household structure and composition.
- Shopping behaviors including how often, where (corner stores vs. supermarket) and who purchased the food, and whether the food purchaser made a grocery list before shopping.

- Information on who was responsible for preparing the food and whether there was a household main meal consumed by all the family members.

Questionnaire items were developed by the investigators or adapted from a questionnaire of the Food Marketing Institute (8). The Food Marketing Institute collects data periodically by telephone interview on food-purchasing trends, attitudes, and behaviors from a representative U.S. population. Our newly developed questionnaire was pilot-tested among a small number of respondents.

The face-to-face interviews were conducted by trained African-American interviewers who lived in the urban community. African-American women ages 18 and older (N=230) who lived in one of three public housing complexes were recruited, by "word of mouth," to participate. This nonprobability sampling method, in which initial participants are used to recruit other members of a community, is called "snowball sampling" (2). A small cash remuneration was provided to the participants. The interviews ranged from 15 to 20 minutes and were conducted in respondents' homes or in nearby community centers.

Focus Groups

Two focus group interviews were conducted, with 10 women, ages 30 to 65, participating in each session. One participant was recruited from each public housing complex within the targeted political jurisdictions in the southeastern section of the urban city. The sessions lasted 2 hours. Each participant received a remuneration of food coupons. The focus group interviews were conducted by a professional African-American female consultant. The questions used in the focus groups were developed using

standard focus group methods (18) to elicit perception of barriers to the purchase, preparation, and consumption of fruits and vegetables. The questions were reviewed by several nutritionists, behavioral scientists, anthropologists, and health educators. In addition, the questions were tested by several target audiences to determine whether the questions were pertinent to this community. Themes used in the focus groups included preparation, cost, access, information, and program participation (table 1).

Analysis

From the questionnaires, we calculated descriptive statistics for the sample's demographic characteristics, as well as food-purchasing behaviors. Student *t* test and chi-squares were used to identify differences in food-purchasing and cooking behaviors by the sample's demographics. Statistical Analysis System (SAS) version 6.12 was used to perform the analysis (22).

The tape-recorded interviews of the focus groups were later transcribed. The two authors read the transcribed material and made independent notes of themes and patterns. We looked at clusters of concepts and ideas between the focus groups (table 1). The theme that emerged focused on barriers to fruit and vegetable consumption, as well as views on behavior-change programs. Original quotes were selected as examples, and the responses that were specific and based on personal experiences were given more consideration than vague and nonspecific responses.

Results

The sample that completed the structured questionnaire comprised 230 women who were 18 to 91 years old (table 2). More than half of the women (56 percent) were less than

Table 1. Focus group themes and questions

Theme 1—Barriers

- What are some of the reasons why people do not buy and eat fruits and vegetables?
- What are some of the problems in preparing fruits and vegetables?
- Do you think cost is an issue for people in your community for eating fruits and vegetables?
- How can we change issues of cost?
- Do you think that having access to fruits and vegetables is a problem for people in your community? How can this problem be resolved?
- Do you think that people just have not heard that eating fruits and vegetables are good for them?

Theme 2—Motivators

- What are the things that motivate people to make a change in their eating habit?
- Where do people get information on food? Do they provide information on eating more fruits and vegetables?
- What was the last such information you saw or heard? What made you pay attention to it?
- As a result of it, did you make a change in your behavior in eating more fruits and vegetables?

Theme 3—Programs

- Have you ever participated in a program that was related to improving your health status?
- What specific aspect of this program did you like or did not like?
- Do you think your friends and neighbors would participate in a program that encouraged them to eat more fruits and vegetables?
- Where and at what time of day should the program take place?
- Who do you think would be a good person to lead the program?
- How would you make the program become a part of the community so that it continued even when the money was gone that started it?

41 years old and had less than a high school education (55 percent), and almost four-fifths (79 percent) were not working (unemployed, retired, a student, or a homemaker). Analysis of the households in which the women lived showed that most (89 percent) lived in households of six or fewer people. The average household consisted of 3.8 people, a somewhat larger figure than the 1999 national average of 2.5 for African Americans

(29). Most of the women lived in households with people less than 18 years old (70 percent) and had lived in public housing for at least 6 years (63 percent). Over one-third of the women (36 percent) were single parents.

Structured Interviews

Dinner was the main meal for most of the respondents (72 percent), and almost all households consume this meal together (96 percent) (table 3).

Use of prepared or “fast” food occurs at least once a week for 55 percent of the respondents. One person, usually the survey respondent, did most of the shopping (75 percent) and shopped for food once every other week (31 percent). About two-fifths (41 percent) of the households plan their meals before buying food, compared with cooking whatever is on hand.

Compared with corner or convenience stores, supermarkets are the main place for food shopping (94 percent), with 70 percent of respondents shopping at markets that are within 10 blocks of their homes. An equal number of respondents (50 percent) use and don’t use an automobile to shop. About one-quarter (22 percent) walk to food markets some of the time (data not shown).

Women who eat dinner as a main meal are significantly older than those whose main meal is at other times of the day (44 vs. 38 years old) (table 4). Those who are living with other adults and children in their households, and those who work are both less likely to be the sole preparer of meals in their home: 34 and 36 percent, respectively.

Patterns of fast-food consumption vary among these respondents.

Women who live with children in their households, either as single parents or with other adults, are significantly more likely to eat fast food at least once a week than those without children in their households. In addition, younger respondents, and those who currently work, are also more likely than their counterparts to eat fast food.

Overall, sociodemographic characteristics of the women did not significantly affect food-shopping behavior (table 5). For this sample, age is the only significant predictor of shopping frequency, with older women,

Table 2. Demographic characteristics of urban African-American women residing in public housing: Structured interviews

Characteristic	Statistic
Sample (n)	230
Women’s age (years)	Mean 43
Household size	3.8
Years in public housing	13
Individual characteristics	
Age (years)	
<20	6
21-40	50
41-60	28
>60	16
Education	
Less than 8th grade	9
8th - 11th grades	46
High school	35
Beyond high school	10
Employment status	
Working full- or part-time	17
Unemployed	34
Retired/student/homemaker	45
Other/don’t know	4
Household characteristics	
Number of people in household	
1-3	47
4-6	42
7-10	11
Number of persons <18 years in household	
None	30
1-3	50
4-7	20
Household composition	
Lives alone	15
Lives with adult(s)	15
Single parent	36
Lives with adult(s) and child(ren)	34
Years in public housing	
0-5	37
6-10	21
11+	42

Focus group participants cited cost as the primary structural barrier to fruit and vegetable consumption.

Table 3. Cooking and food-purchasing behaviors of urban African-American women residing in public housing: Structured interviews

Characteristic	Statistic
Sample (n)	230
	Percent
Main meal of the day	
Dinner	72
Other	28
Most people in household eat main meal together	
Yes	96
No	4
Meal preparer	
Self only	79
Other ¹	21
Use of fast-food per week	
1-7 times each week	55
Never/seldom	45
Grocery shopper	
Self only	75
Other ¹	25
Frequency of food shopping	
Once a week or more	26
Once every 2 weeks	31
Once a month	23
As we need food	20
When most food shopping is done	
Beginning of the month	49
Middle of the month	35
End of the month	4
No preference/anytime	12
How cooking is planned	
Plan before buying	41
Cook what is on hand	52
Both	7
Where most food shopping is done	
Supermarket	
Yes	94
No	6
Corner/convenience store	
Yes	4
No	96
Distance to supermarket	
Less than 5 blocks	37
5-10 blocks	33
More than 10 blocks	30
Car used to shop	
Yes	50
No	50
Food received from other sources ²	
SHARE program ³	12
WIC program ⁴	24
Community co-op	16
Other	15
None	45

¹ Other includes the respondent and another person who share the responsibility.

² A single subject may receive food from more than one category.

³ Self-Help and Resource Exchange.

⁴ Women, Infants and Children.

Table 4. Meal patterns of African-American women¹ residing in public housing, by demographic characteristics: Structured interviews

Characteristic	Main meal is dinner		Meals made by self only		Fast-food used once a week or more	
	Yes	No	Yes	No	Yes	No
Age (years)	44	38*	Mean		38	47*
Years in public housing	14	11	13	16	13	15
Household composition	Percent					
Lives alone	71	29	97	3	33	67
Lives with adult(s)	76	24	71	29	45	55
Single parent	70	30	89	11	63	37
Lives with adult(s) and child(ren)	71	29	66	34*	60	40*
Employment status						
Working	72	28	64	36	71	29
Not working	71	29	82	18*	50	50*
Education						
Less than high school	83	17	87	13	33	67
High school or more	70	30	78	22	43	57*
Distance to the supermarket						
1-5 blocks	65	35	74	26	56	44
More than 5 blocks	76	24	82	18	54	46
Uses car to shop						
Yes	73	27	75	25	58	42
No	70	30	83	17	51	49

¹ n=230.

*Women using these meal patterns are significantly different, based on *t* tests (age) and chi-square tests (categorical variables), at *p*<0.05.

on average 48 years old, being more likely to report shopping at least every week. Frequency of planning before buying food and using nonpurchased food (received through WIC or charitable organizations) are consistent across the entire sample, with about half of the respondents reporting these behaviors.

Focus Groups

Focus group participants cited cost as the primary structural barrier to fruit and vegetable consumption. They identified some fruits and vegetables

as more economical than others but believed fruits and vegetables overall were costly, compared with other foods, especially by volume or portion. Volume and the ability to provide family members with a significant quantity of food were an important dimension of the cost theme. For example, grapes and apples were mentioned often as highly desirable fruits in terms of taste but were impractical, compared with potatoes prepared as home fries, in terms of "filling up" the family.

"They [fruits and vegetables] cost more than some of the other things we can eat. If you buy starches, you can stretch them. Two cucumbers for \$1 maybe, then where is the rest of the salad? You know you are going to want more than cucumbers in your salad. . . . You see, if you have eight kids, you have to be able to have enough food for all of them. Say you buy apples, you have to buy eight of them or at least 10. That's quite a big bill for apples."

Table 5. Food-purchasing behaviors of African-American women¹ residing in public housing, by demographic characteristics: Structured interviews

Characteristic	Plans before buying food		Shops at least every week		Uses free food	
	Yes	No	Yes	No	Yes	No
Age (years)	42	43	48	41*	43	43
Years in public housing	12	14	13	14	14	13
Household composition			Percent			
Lives alone	57	43	41	59	54	46
Lives with adult(s)	29	71	29	71	47	53
Single parent	48	52	20	80	58	42
Lives with adult(s) and child(ren)	47	53	23	77	55	45
Employment status						
Working	56	44	15	85	41	59
Not working	46	54	27	73	57	43
Education						
Less than high school	39	61	39	61	61	39
High school or more	48	52	24	76	54	46
Distance to the supermarket						
1-5 blocks	44	56	30	70	59	41
Less than 5 blocks	49	51	23	77	53	47
Uses car to shop						
Yes	49	51	23	77	51	49
No	45	55	28	72	59	41

¹ n=230.

*Women with these food-purchasing behaviors are significantly different, based on t tests (age) and chi-square tests (categorical variables), at p<0.05.

"I don't buy my fruits or vegetables unless they are on sale. . . . You can clip a coupon for a can good, but you never see a coupon for fresh fruits and vegetables."

"We need to think of a way to put money in the area specifically for fruits and vegetables. That's all you can use [those] little green coupons [referring to food stamps] for: fruits and vegetables. You can't buy meat, you can't buy [anything]. Just fruits and vegetables every month."

Most respondents acknowledged that their usual meals did not meet their own standards for nutrition but that it was often beyond their financial and emotional skills to plan and prepare complex meals. Foods such as Oodles of Noodles[®] were mentioned often in contrast; they were seen as inexpensive, easier to store and prepare rapidly, and reliably acceptable as a meal to children.

Low- or no-cost food programs were discussed as avenues to decrease the cost of fruits and vegetables but were

seen as a less desirable source of food, compared with directly purchasing food. This was in part because of the uncertain quality and the schedule and volume of distribution. It was also considered less durable because of how the food was distributed. The method used tainted the perceived value of the food. Several respondents described a program in which local farm trucks dumped surplus potatoes onto the ground near the housing complexes.

"They shouldn't just throw it on the ground. We are taught not to eat off the ground."

They [women] asked for activities to learn and share menus that would meet several criteria: Convenience and cost, health, and children's tastes.

"It's like we are animals. It does something to the way your children feel. Even though they know you may... get food stamps but to see you go out there and get that food [off the ground]—they don't understand it."

Compared with the significance of cost, only a few other structural barriers were considered important. Some respondents, however, did discuss barriers such as carrying canned fruits and vegetables home from the store and freezing or storing sufficient fruits and vegetables in small apartments.

As women and heads of households, most participants described themselves as cooking for others as well as for themselves; many spoke of the difficulty of balancing the family's and children's preferences with budgeting and cooking constraints. They frequently compared their situations to their parents'; they believed they were making a conscious decision to allow their children more choices in foods than they had been given.

"I think the times we are living in make a difference. For example, when I was growing up, if they put string beans or squash in front of me, or anything else that was in season that they could afford, I ate it. . . . Today's parents say if they don't like it 'get on up.'"

"I believe it is an emotional thing. When I was growing up, you had to eat what they gave you. I just thought that was so mean, and I swore that I wasn't going to treat my children like that. They don't want it, they do not have to eat it."

"You shouldn't have to eat fruits and vegetables if you don't like them."

Knowledge of vegetable preparation techniques was discussed. Many women believed that there was less knowledge of cooking techniques in their communities than in previous generations. They also believed that older women in general were more knowledgeable about food-preparation skills. Few women acknowledged their own need for education in this area; however, some indicated that when cooking, they asked their mothers for information.

When asked what could make people change their eating behaviors, women universally favored small group processes, led by both peers and educators. They asked for activities to learn and share menus that would meet several criteria: Convenience and cost, health, and children's tastes. They believed that participatory activities, including sessions for family and children to eat the foods and share menus developed, would help them use their new knowledge and menus to make a sustainable transition from group to home use. Barriers to use of text-based educational materials were also discussed; the respondents agreed that "pictures will definitely do the trick." Perceived drawbacks to previous programs focused on program leaders' lack of understanding of the emotional difficulties inherent in changing one's behavior and the perception that participants had been talked to as though they were unknowledgeable.

"It may not be that I don't know how [to cook]. It may be that I [have] this esteem problem or that I want somebody to share [the meal] with; my 2-year-old sitting up here and playing in the food [isn't] enough for me to stand up in the kitchen [for] 2 hours."

This comment highlights the lack of social support these women believe exists regarding their meal-preparation and eating activities.

Discussion

This study explored the food-purchasing behaviors and barriers to consuming fruits and vegetables among women residing in an urban area. Our study was focused in a relatively homogeneous residential area, so respondents shared a common geography for stores and resources. They, as well, shared common social and cultural backgrounds. These commonalities allowed us to focus on the psychological and social dimensions of shopping and eating behaviors. This homogeneity, however, is also a limitation. The sample was drawn from a small area of a city, and no comparison was made with other groups. Snowball sampling was used to recruit the respondents. Thus the results of the focus groups and structured interviews may not be representative of larger populations. However, our results are supported by existing work in this area.

Previous studies reporting focus group interviews assessing the barriers to fruit and vegetable consumption have used low-income populations attending food-related programs (21,28). For example, one study focused on the barriers among women with young children who were participating in the Expanded Food and Nutrition Education Program (EFNEP) (21). Another focused on low-income women participating in the WIC program (28). Similar to these studies, our study showed that childhood eating/feeding practices and consumption of fruits and vegetables are linked. Positive or negative influences on fruit and vegetable consumption in relation to

life course events have been described by several investigators (6,14,20,28).

Overwhelmingly, our study revealed that the main barriers to increased fruit and vegetable consumption were social and psychological. Many were interpersonal in nature and involved the costs and benefits of preparing vegetables for other family members, especially children. For example, similar to respondents in the EPNEP study (21), our respondents reported that childhood memories of being forced to eat vegetables were a deterrent to requiring their children to eat an adequate amount of vegetables.

Barriers to purchasing and consuming fruits and vegetables and food in this community were widely driven by the external as well as internal factors. Consistent with other findings (17), our findings indicate that the cost of fruits and vegetables was a major deterrent. In the urban setting of our study, the availability of fruits and vegetables in stores was not a major issue; getting to the store, however, could have been because only half of the sample used an automobile for shopping. In this public housing community, frequency of shopping in a supermarket ranged from once a month to more than once a week, with the median frequency being once every 2 weeks. This may be, in part, due to lack of access to automobiles. In comparison, the Food Marketing Institute (8) reports that, on average, the general public visits a supermarket 2.2 times per week.

The lower frequency of shopping in this population reduces the likelihood of a constant supply of fresh produce in the home throughout the month. Economic influences are no doubt a strong influence on this shopping schedule, because the beginning of the calendar month—when benefits are issued—was the most common shopping date. This schedule suggests that strategies for

buying and storing canned fruits and vegetables for the end of the month will be more successful than trying to promote more frequent purchase of costly fresh produce.

Although several organizations provided free or subsidized foods in the study community, purchased food was most desirable and most commonly used because of poor distribution practices. Cultural meanings differ significantly between rural and urban settings; while placing foods such as potatoes on the ground may be a routine event to food growers, it was interpreted as offensive by many in the study community.

It was evident, from the focus groups and structured interviews, that women had a major role and responsibility for purchasing food and preparing meals, a finding which is consistent with another study (17). From these data, we see that an evening meal is the central meal. Moreover, in most cases, all members of the household consumed the evening meal together. This meal is likely to be one in which the food choices made by the person preparing the meal could potentially influence the diet of all household members. Our results belie the stereotype of low-income households having little structure in their meals, and this is a positive starting point for interventions. In addition, the participants were knowledgeable about what constituted healthful food choices and were very much interested in learning more about nutrition. To take the next step in developing knowledge and skills among this population, nutrition professionals must use interventions that take advantage of these positive avenues for behavior change.

Lack of social support for shopping, meal preparation, and eating activities were expressed during the focus group. Educational programs, therefore,

should be organized to address socio-emotional issues such as encouraging meal preparers to car pool and partner with friends for cooking, as well as eat with friends. Acquiring these skills will be beneficial for single parents struggling with children's issues about fruits and vegetables. The clustered housing structure of these communities is an asset to reinforce these skills.

Despite some differences, it appears that women with relatively more socioeconomic resources (i.e., those who have completed high school or are currently working) do behave somewhat differently from those with less resources, but overall these households do not vary substantially in their food-related behaviors. This may indicate that similar strategies for promoting food-related behavior change could benefit all types of households within these public housing complexes.

Through these focus groups, we explored the issue of how this community would like to seek and receive information and which styles of approach are acceptable during intervention. The leaders of interventions would be most successful if they were older women from the community, and as such would merit respect as successful and knowledgeable homemakers. This reinforces the value placed on culturally relevant life experiences, rather than textbook solutions from the majority culture, for solving problems in this community. Respondents did not want to be talked to as unknowledgeable learners. Thus the information must be communicated in ways which are culturally respectful and socioemotionally supportive.

Ralston and Cohen (20) suggest several strategic approaches for delivering nutrition education among Black elders, many of which may be relevant for educating African-American communities in urban areas.

Several nutrition education interventions have been conducted among low-income populations, with results showing a positive intervention effect among Minnesota participants in EFNEP (12). A pilot project to increase fruits and vegetable consumption among the EFNEP population in Massachusetts has shown a positive effect working through existing social networks (7). A church-based, culturally sensitive intervention among African-American women has been effective in increasing fruit and vegetable consumption (5). Others (30) have shown that cooking events were more effective than the 5 A Day advertising campaign alone in increasing understanding of the 5 A Day message among low-income families.

In developing nutrition education programs for urban populations, such as the public housing community we studied, professionals who work with these groups should highlight the use of urban resources such as local farmers' market and personal gardens. In addition, educational strategies should emphasize nonperishable foods, including dried fruits and frozen or concentrated juices, included in the 5 A Day program.

For this urban sample of African-American women who lived in a public housing, homogeneous community, many barriers may make it difficult to assimilate information as currently disseminated from national nutrition campaigns, thereby limiting the benefits these campaigns may provide. Coupling educational activities with peer and social intervention will enhance the probability of effectiveness for national campaigns among the groups in our society who most need them.

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References

1. Appel, L.J., Moore, T.J., Obarzanek, E., Vollmer, W.M., Svetkey, L.P., Sacks, F.M., Bray, G.A., Bogt, T.M., Cutler, J.A., Windhauser, M.M., Lin, P.-H., Karanja, N., Simons-Morton, D., McCullough, M., Swain, J., Steele, P., Evans, M.A., Miller, E.R., and Harsha, D.W. (DASH Collaborative Research Group). 1997. A clinical trial of the effects of dietary patterns on blood pressure. *New England Journal of Medicine* 336(16):1117-1124.
2. Babbie, E. 1994. *The Practice of Social Research, 7th Edition*. Wadsworth, Belmont, CA.
3. Bronner, Y., Burke, C., and Joubert, B.J. 1994. African-American/soul food ways and nutrition counseling. *Topics in Clinical Nutrition* 9(2):20-27.
4. Byars, D. 1996. Traditional African American foods and African Americans. *Agriculture and Human Values* 13(1):74-78.
5. Barnhart, M.J., Massavar-Rahmani, Y., Nelson, M., Rainford, Y., and Wylie-Rosset, J. 1998. An innovative, culturally-sensitive dietary intervention to increase fruit and vegetable intake among African-American women: A pilot study. *Topics in Clinical Nutrition* 13(2):63-71.
6. Devine, C.M., Wolfe, W.S., Frongillo, E.A., and Bisogni, C.A. 1999. Life-course events and experiences: Association with fruit and vegetable consumption in 3 ethnic groups. *Journal of the American Dietetic Association* 99(3):309-314.
7. Emmons, M.K., Macario, E., Sorensen, G., Hunt, M.K., and Rudd, R.E. 1999. Nutrition education for cancer prevention among low-income populations: An extension of the EFNEP model. *Journal of Nutrition Education* 31(1):47-53.
8. Food Marketing Institute. 1996. *Trends in the United States. Consumer Attitudes and the Supermarket*. Food Marketing Institute, Washington, DC.
9. Gey, K.F., Moser, U.K., Jordan, P., Stahelin, H.B., Eichholzer, M., and Ludin, E. 1993. Increased risk of cardiovascular disease at sub-optimal plasma concentrations of essential antioxidants: An epidemiological update with special attention to carotene and vitamin C. *American Journal of Clinical Nutrition* 57 (5 suppl):787S-797S.
10. Greger, J.L. 1999. Nondigestible carbohydrates and mineral bio-availability. *Journal of Nutrition* 129:1434S-1435S.
11. Hargreaves, M.K., Baquet, C., and Gamshadzhah, A. 1989. Diet, nutritional status, and cancer risk in American blacks. *Nutrition and Cancer* 12(1):1-28.
12. Hartman, T.J., McCarthy, P.R., Park, R.J., Schuster, E., and Kushi, L.H. 1997. Results of a community-based low-literacy nutrition education program. *Journal of Community Health* 22(5):325-341.
13. Kittler, P.G. and Sucher, K. 1989. *Food and Culture in America*. Van Nostrand Reinhold, New York, NY.

-
14. Krebs-Smith, S.M. 1995. Psychosocial factors associated with fruit and vegetable consumption. *American Journal of Health Promotion* 10(2):98-104.
15. Krebs-Smith, S.M., Cook, D.A., Subar, A.F., Cleveland, L., and Friday, J. 1995. US adults' fruits and vegetable intakes, 1989 to 1991: A revised baseline for the Healthy People 2000 Objective. *American Journal of Public Health* 85(12):1623-1629.
16. Kumanyika, S., Shankar, S., Mitchell, P., Ganganna, P., Smith, S.A., Thompson, L., and Tuckermanty, E. 1990. Recommended strategies for dietary modification. Report of the Technical Advisory Panel on Dietary Modification. U.S. Department of Health and Human Services, Bureau of Cancer Control, Washington, DC.
17. Macario, E., Emmons, K.M., Sorensen, G., Hunt, M.K., and Rudd, R. 1998. Factors influencing nutrition education for patients with low literacy skills. *Journal of the American Dietetic Association* 98(5):559-564.
18. Morgan, D.L. and Krueger, R.A. 1998. *The Focus Group Kit*. Sage Publishing, Thousand Oaks, CA.
19. Patterson, B.H., Block, G., Rosenberger, W., Pee, D., and Kahle, L. 1990. Fruit and vegetables in the American diet: Data from the NHANES II survey. *American Journal of Public Health* 80(12):1443-1449.
20. Ralston, P.A. and Cohen, N. 1999. Nutrition education for elders: A strategic approach for delivery. *Journal of Nutrition Education* 31(4):230-234.
21. Reicks, M., Randall, J.L., and Haynes, B.J. 1994. Factors affecting consumption of fruits and vegetables by low-income families. *Journal of the American Dietetic Association* 94(11):1309-1311.
22. The SAS System for Windows (computer program). Release 6.12. 1996. The SAS Institute, Inc., Cary, NC.
23. Shankar, S., Subar, A.F., Hartman, A.M., Jobe, J.B., and Ziegler, R.G. 1998. Development of a food frequency questionnaire for an African-American population. *International Journal of Nutrition*. 3rd International Conference on Dietary Assessment Methods.
24. Steinmetz, K.A. and Potter, J.D. 1991. Vegetables, fruit and cancer, 1. Epidemiology. *Cancer Causes and Control* 2(5):325-357.
25. Steinmetz, K.A. and Potter, J.D. 1996. Vegetables, fruit and cancer prevention: A review. *Journal of the American Dietetic Association* 96(10):1027-1039.
26. Taylor, A., Jacques, P.F., and Epstein, E.M. 1995. Relations among aging, antioxidant status, and cataracts. *American Journal of Clinical Nutrition* 62(6 suppl):1439S-1447S.

-
27. Thompson, B., Demark-Wahnefried, W., Taylor, G., McClelland, J.W., Stables, G., Hayes, S., Feng, Z., Topor, M., Heimendinger, J., Reynolds, K.D., and Cohen, N. 1999. Baseline fruit and vegetable intake among adults in seven 5 A Day study centers located in diverse geographic areas. *Journal of the American Dietetic Association* 99:1241-1248.
28. Treiman, K., Freimuth, V., Daamron, D., Lasswell, J., Alinker, J., Havas, P., Langenberg, P., and Feldman, R. 1996. Attitudes and behaviors related to fruits and vegetables among low-income women in the WIC program. *Journal of Nutrition Education* 28:149-156.
29. United States Census Bureau. Projected Number of Households by Type, Race and Hispanic Origin: 1995 to 2010, Series 3. [On-line] Available: <http://www.census.gov/population/projections/nation/hh-fam/table4n.txt>.
30. Weaver, M., Poehlitz, M., and Hutchison, S. 1999. 5 A Day for low-income families: Evaluation of an advertising campaign and cooking events. *Journal of Nutrition Education* 31(3):161-169.
31. World Cancer Research Fund and American Institute of Cancer Research. 1997. *Food, Nutrition and Prevention of Cancer: A Global Perspective*. Washington, DC.

Caffeine and Theobromine Intakes of Children: Results From CSFII 1994-96, 1998

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Caffeine and theobromine are naturally occurring purine alkaloids, which act as stimulants to the central nervous system. They are widely consumed through foods such as coffee, tea, cola, and chocolate. A variety of adverse health effects have been attributed to their consumption, including behavior abnormalities, hypertension, and hypercholesterolemia, though inconsistently. Existing data suggest that caffeine intake begins early in life, and that children are susceptible to caffeine and theobromine toxicity because their detoxifying mechanisms are not fully developed (4,5).

Food composition values for caffeine and theobromine were recently added to the United States Department of Agriculture's (USDA) Survey Nutrient Database; and data from the Continuing Survey of Food Intakes by Individuals (CSFII) 1994-96, 1998 (12), compiled by the Agricultural Research Service, have been used here to provide national probability estimates of caffeine and theobromine intakes for children through age 9.

Methods

Data presented are based on 24-hour recalls from 9,802 children compiled from the CSFII 1994-96, 1998 databases. Two nonconsecutive days of food intake data were collected during in-person interviews. The results are

weighted to adjust for differential rates of sample selection and nonresponse and to calibrate the sample to match population characteristics that are correlated with eating behavior. The design, methodology, and operation of the CSFII 1994-96 are detailed in a separate report (10). The CSFII 1998, a survey of children through 9 years of age, was designed to be combined with CSFII 1994-96. Similar approaches to sample selection, data collection, and weighting were used.

The caffeine and theobromine composition of foods was compiled from data supplied by the Nutrient Data Laboratory (Beltsville Human Nutrition Research Center, Agricultural Research Service, Beltsville, MD). Intake data were analyzed using SAS version 8.02 (SAS, Cary, NC) and SUDAAN (Research Triangle Institute, Research Triangle Park, NC). Mean and median intakes of caffeine and theobromine were estimated. The median may be a more meaningful statistic than the traditional mean for skewed distributions (9), such as the intakes of caffeine and theobromine. The Student *t* test was used to test differences in means between groups.

The food sources of caffeine and theobromine were also determined. Mean intakes are based on respondents' intakes on the first surveyed day, whereas sources of caffeine and theobromine are based on respondents' 2-day average intakes. This follows the

Table 1. Children's intakes of caffeine and theobromine,¹ CSFII 1994-96, 1998, 1 day

Age	Sample size (unweighted)	Caffeine						Theobromine					
		All individuals			Consumers			All individuals			Consumers		
		Mean (mg)	Median (mg)	Percent consuming	Mean (mg)	Median (mg)		Mean (mg)	Median (mg)	Percent consuming	Mean (mg)	Median (mg)	
Under 1	1,126	0.4*	0	4.3	8.9*	1.5*		0.7	0	3.4	19.8*	11.6*	
1-2	2,118	6.7	0	42.0	15.8	5.7	21.1	0	34.4	61.5	29.7		
3-5	4,574	12.7	2.2	61.8	20.6	9.3	45.5	1.8	50.8	89.5	50.3		
6-9	1,491	20.9	5.0	70.8	29.5	13.5	58.8	17.6	59.9	98.1	57.5		
9 and under	9,309	13.9	1.4	57.2	24.2	10.0	42.5	0	47.6	89.3	57.4		

¹Excludes breast-fed children.

*Coefficient of variation > 30 percent.

*Small sample size.

reporting practices of the Food Surveys Research Group at USDA. Mean intakes of food components are presented for the first surveyed day so that over time data users can compare day-1 intakes from surveys that include different numbers of days. The 2-day average is used for reporting foods consumed, since it better represents an individual's usual intake of any one food (10).

Results and Discussion

Mean caffeine and theobromine intakes for various age groups are presented in table 1. Data are presented for all children, and separately, for only those who consumed foods containing caffeine and theobromine. Breast-fed children were excluded from estimates in all tables. Unweighted counts of survey respondents on which estimates are based are also provided. In general, the sample sizes for each sex-age group provide a sufficient level of precision to ensure statistical reliability of the estimates. Data that are potentially unreliable because of a small sample size or large coefficient of variation are flagged, and should be used with caution. Data for males and females were combined because differences in mean intakes of caffeine and

theobromine based on gender were small for children 9 years of age and under.

The mean daily caffeine intake for all children through age 9 was 13.9 mg (table 1) or 8.3 mg/1,000 kcal (data not shown). Mean intakes ranged from 0.4 mg for children under 1 year to 20.9 mg for 6- to 9-year-olds. For comparison, mean caffeine intakes from the CSFII 1994-96, 1998 for ages 12-19 were 85.5 mg or 31.4 mg/1,000 kcal for males and 58.8 mg or 35.2 mg/1,000 kcal for females (11). The median caffeine intake for all children through age 9 was 1.4 mg, and the intake at the 90th percentile was 43.8 mg (data not shown).

A little more than half of the children (57 percent) consumed one or more foods containing caffeine. This percentage increased with age, from 4 percent for children under 1 year to 71 percent for 6- to 9-year-olds. For those children who consumed caffeine-containing foods, the mean daily intake was 24.2 mg, about the amount of caffeine in 8 ounces of cola. (See box for caffeine and theobromine content of selected foods. Additional values can be found on the Nutrient Data Laboratory Web site at www.nal.usda.gov/fnic/foodcomp/.) Mean caffeine intakes for consumers ranged from 8.9 mg for children under 1 year to 29.6 mg for 6- to 9-year-olds.

Caffeine and theobromine contents of selected foods

	Caffeine	Theobromine
	-----mg-----	
Candy, milk chocolate, 1.45 oz bar	11	69
Chocolate syrup, 1 tablespoon	3	89
Cocoa and sugar mix, milk added, 8 fl oz cup	7	250
Cola, regular, 12 fl oz can	37	0
Coffee, made from ground, 8 fl oz cup	137	0
Coffee, made from powdered instant, 8 fl oz cup	68	0
Cookie, chocolate sandwich, 1" - 1-1/2" diameter	1	47
Tea, made from leaves, 8 fl oz cup	47	5
Tea, made from powdered instant, 8 fl oz cup	25	2

Table 2. Comparison of children's intakes of caffeine and theobromine,¹ by race, CSFII 1994-96, 1998, 1 day

Age	Sample size (unweighted)		Caffeine			Theobromine		
	White	Black	White	Black	Difference	White	Black	Difference
					Means			
Under 1	738	194	0.4*	0.7*	-0.3	0.8*	0.4*	0.4
1-2	1,459	332	7.3	5.5	1.8	22.7	15.1	7.6
3-5	3,181	695	14.3	8.5	5.8*	51.4	26.4	25.0*
6-9	1,059	231	23.2	14.8	8.5*	69.3	30.3	39.0*
9 and under	6,437	1,452	15.7	9.6	6.0*	49.6	23.4	26.2*

¹Excludes breast-fed children.

*Coefficient of variation > 30 percent.

*p value < 0.01.

A few earlier studies have reported caffeine intakes in children. In the Bogalusa Heart Study (1), caffeine intakes were examined for a biracial sample of 1,284 infants and children. Mean intakes ranged from 2.1 mg for 6-month-old black girls to 147 mg for 17-year-old white boys. They reported highest percentage of caffeine consumers among 2- and 3-year-olds, 91 and 93 percent, respectively. Morgan and colleagues (7) reported mean intakes of 37.4 mg using 7-day food records for a sample of 1,135 5- to 18-year-olds. Intakes for age groups comparable to our study population were 21.9 mg for 5- to 6-year-olds, and 19.3 mg for 7- to 8-year-olds.

Morgan reported that 98 percent of the sample consumed caffeine at least once during the 7-day period. Another group (3) reported mean daily intakes of 16 mg and a median intake of 15.2 mg/day for 96 6- to 10-year-olds participating in the Framingham Children Study in 1995. They reported that caffeine was consumed on 79 percent of the days that 3-day food diaries were collected. Differences in results among the studies may be due to several factors, including differences in methodology, age of sample, regional and socioeconomic

differences, variability in food caffeine values (2), increase in consumption of fruit drinks and noncitrus fruit juices among children (8), and greater availability of caffeine-free carbonated drinks.

The average theobromine intake among different age groups ranged from 0.7 mg for children under 1 year to 58.8 mg for 6- to 9-year-olds, with a mean intake of 42.5 mg or 23.8 mg/1,000 kcal for all children through age 9 (table 1). The median intake was 0 mg, and the intake at the 90th percentile was 126.5 mg (data not shown). The percentage of children who consumed theobromine-containing foods was even lower than that for caffeine: 48 percent versus 57 percent. The average theobromine intake among these consumers was 89.3 mg, about the amount of theobromine in 1 tablespoon of chocolate syrup. No existing data are available to compare theobromine intakes from our study with others.

Considerable differences were found when comparing mean caffeine and theobromine intakes of black and white children, as presented in table 2. White children consumed almost two-thirds more caffeine than black children (15.7 mg vs. 9.6 mg), and about twice as

much theobromine (49.6 mg vs. 23.4 mg). The differences are statistically significant at the 0.01 percent levels for age groups 3-5 and 6-9, as well as for all children through age 9. The racial differences persisted when income defined as percent of federal poverty guidelines was considered. These findings are in concurrence with the Bogalusa Heart Study (1).

The proportions of caffeine and theobromine contributed by different food groups are presented in table 3. These data represent population proportions as described by Krebs-Smith and colleagues (6). Carbonated beverages containing caffeine furnished more than half the total caffeine intake for all children, except for children under 1 year and 1- to 2-year-olds. For children under 1 year, most caffeine was obtained from tea; for 1- to 2-year-olds, the amounts from carbonated beverages and tea were about equal. For the other age groups, tea was the second largest contributor.

Chocolate-containing foods provided nearly one-fifth of total caffeine intake and almost all of the total theobromine intake; the top contributors were chocolate cookies, chocolate milk beverages, and chocolate syrup. While

Table 3. Contribution of food groups to caffeine and theobromine for children,¹ CSFII 1994-96, 1998, 2-day average

Age	Caffeine				Theobromine	
	Carbonated beverages	Tea	Chocolate-containing foods	Coffee	Tea	Chocolate-containing foods
				Percent		
Under 1	17.9 ^a	67.8	14.3 ^a	0	2.5 ^a	97.5 ^a
1-2	41.8	40.2	16.8	1.2 ^a	1.3 ^a	98.7 ^a
3-5	51.4	28.0	18.3	2.3	0.8	99.2
6-9	54.6	25.8	17.5	2.1	0.8 ^a	99.2 ^a
9 and under	52.1	28.2	17.6	2.1	0.9	99.1

^aExcludes breast-fed children.

^aIndicates an estimate based on small sample size or coefficient of variation > 30 percent.

Note: Calculated using the population proportion method.

carbonated beverages contributed the most caffeine to the population, more children actually obtained caffeine from chocolate-containing foods than from carbonated beverages: forty-four percent of children consumed chocolate-containing foods compared with 20 percent of children who drank carbonated beverages containing caffeine.

Two groups (1,3) previously identified carbonated beverages as the major contributor of caffeine, followed by chocolate-containing foods, and tea. However, Morgan's group (7) reported tea as the major source, followed by carbonated beverages, coffee, and chocolate-containing foods. Increases in the consumption of carbonated beverages and method used to compute proportions (6), as well as other differences cited above, may explain the differences in our findings. No racial or gender differences were noted for sources of caffeine or theobromine.

Summary

Our study provides national probability estimates for caffeine and theobromine intakes for children 9 years old and under in the United States. The results suggest lower percent of caffeine use among children than previously reported. A little more than half of the children consumed caffeine-containing foods on a given day. The study is a first attempt to provide estimates of consumption of theobromine among children. Children's intake of theobromine is higher than that of caffeine and is mainly obtained from chocolate-containing foods. The consumption of caffeine and theobromine is higher among white children than their black counterparts.

References

1. Arbeit, M.L. 1988. Caffeine intakes of children from a biracial population: The Bogalusa Heart Study. *Journal of the American Dietetic Association* 88(4):466-471.
2. Barone, J.J. and Roberts, H.R. 1996. Caffeine consumption. *Food and Chemical Toxicology* 34(1):119-129.
3. Ellison, R.C., Singer, M.R., Moore, L.L., Nguyen, U.S., Garrahie, E.J., and Marmor, J.K. 1995. Current caffeine intakes of young children: Amount and sources. *Journal of the American Dietetic Association* 95(7):802-804.
4. Eteng, M.U. 1997. Recent advances in caffeine and theobromine toxicities: A review. *Plant Foods for Human Nutrition* 51:231-243. Kluwer Academic Publishers, Dordrecht, Netherlands.
5. Gilbert, R.M. 1980. *Caffeine: Overview and Anthology*. *Nutrition and Behavior* (pp. 145-166). Sandford A. Miller.
6. Krebs-Smith, S.M., Kott, P.S., and Guenther, P.M. 1989. Mean proportion and population proportion: Two answers to the same question? *Journal of the American Dietetic Association* 89(5):671-676.
7. Morgan, K.J., Stults, V.J., and Zabik, M.E. 1982. Amount and dietary sources of caffeine and saccharin intake by individuals ages 5 to 18 years. *Regulatory Toxicology and Pharmacology* 2(4):296-307.
8. Research News, U.S. Department of Agriculture, Agricultural Research Service. What and Where Our Children Eat—1994 Nationwide Survey Results, April 18, 1996.
9. Sokal, R.R. and Rohlf, F.J. 1987. *Introduction to Biostatistics* (2nd ed., pp. 30-33). W. H. Freeman and Company, New York.
10. Tippet, K.S. and Cypel, Y.S. (Eds.). 1998. Design and Operation: Continuing Survey of Food Intakes by Individuals and Diet and Health Knowledge Survey, 1994-96. U.S. Department of Agriculture, Nationwide Food Surveys Report No. 96-1.
11. U.S. Department of Agriculture, Agricultural Research Service. 1999. Food and Nutrient Intakes by Children 1994-96, 1998. [On-line]. Available: <http://www.barc.usda.gov/bhnrc/foodsurvey/home.htm>
12. U.S. Department of Agriculture, Agricultural Research Service. 2000. Continuing Survey of Food Intakes by Individuals 1994-96, 1998. National Technical Information Service. CD-ROM. NTIS Accession no. PB2000-500027.

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Body Mass Index and Health

Many Americans are becoming overweight or obese (1-3). These conditions can lead to chronic diseases such as high blood pressure, diabetes, stroke, cancer, and diseases of the gallbladder, heart, and lungs (1-8). Such diseases can reduce the quality of life and can also lead to death (1,4,9). Body Mass Index (BMI) is one of the most commonly used measures of obesity.

What Is Body Mass Index?

BMI is a ratio of a person's weight to height. BMI is commonly used to classify weight as "healthy" or "unhealthy."

How Is BMI Determined?

BMI can be determined by using the following equation:

$$\text{BMI} = 705 \times \frac{\text{Body weight (in pounds)}}{\left(\frac{\text{Height (in inches)}}{\text{Height (in inches)}} \right)^2}$$

Example:

A person who is 5 feet 6 inches (66 inches) tall and weighs 155 pounds has a BMI of 25:

1 foot = 12 inches, therefore 5 feet = 5 x 12 = (60 inches) + 6 inches = 66 inches

$$\text{BMI} = 705 \times 155 \div (66 \times 66) = 25$$

What Does BMI Mean?

BMI values between 18.5 and 24.9 are considered "normal" or "healthy" weight (table 1). BMI values between 25 and 29.9 are considered "overweight" and 30 and above are considered "obese." BMIs above 25 are unhealthy and have been shown to increase the risk of certain chronic diseases (1-8). BMIs under 18.5 are considered "underweight."

Table 2 can also be used to estimate BMI. Find height in inches. Move across to the right and choose the nearest weight in pounds. BMI can be found at the bottom of that column.

Can BMI Be Used by Everyone?

For most people, BMI provides a good measure of obesity. However, BMI does not provide actual information on body composition (i.e., the proportions of

Table 1. Body Mass Index categories

BMI	Weight category
Less than 18.5	Underweight
18.5 - 24.9	Normal weight
25 - 29.9	Overweight
30 and above	Obese

Source: National Institutes of Health (NIH), 1998.

Table 2. Body Mass Index look-up table

Height	Weight in pounds																			
4' 10" (58")	91	96	100	105	110	115	119	124	129	134	138	143	148	153	158	162	167			
4' 11" (59")	94	99	104	109	114	119	124	128	133	138	143	148	153	158	163	168	173			
5' (60")	97	102	107	112	118	123	128	133	138	143	148	153	158	163	168	174	179			
5' 1" (61")	100	106	111	116	122	127	132	137	143	148	153	158	164	169	174	180	185			
5' 2" (62")	104	109	115	120	126	131	136	142	147	153	158	164	169	175	180	186	191			
5' 3" (63")	107	113	118	124	130	135	141	146	152	158	163	169	175	180	186	191	197			
5' 4" (64")	110	116	122	128	134	140	145	151	157	163	169	174	180	186	192	197	204			
5' 5" (65")	114	120	126	132	138	144	150	156	162	168	174	180	186	192	198	204	210			
5' 6" (66")	118	124	130	136	142	148	155	161	167	173	179	186	192	198	204	210	216			
5' 7" (67")	121	127	134	140	146	153	159	166	172	178	185	191	198	204	211	217	223			
5' 8" (68")	125	131	138	144	151	158	164	171	177	184	190	197	203	210	216	223	230			
5' 9" (69")	128	135	142	149	155	162	169	176	182	189	196	203	209	216	223	230	236			
5' 10" (70")	132	139	146	153	160	167	174	181	188	195	202	209	216	222	229	236	243			
5' 11" (71")	136	143	150	157	165	172	179	186	193	200	208	215	222	229	236	243	250			
6' (72")	140	147	154	162	169	177	184	191	199	206	213	221	228	235	242	250	258			
6' 1" (73")	144	151	159	166	174	182	189	197	204	212	219	227	235	242	250	257	265			
6' 2" (74")	148	155	163	171	179	186	194	202	210	218	225	233	241	249	256	264	272			
6' 3" (75")	152	160	168	176	184	192	200	208	216	224	232	240	248	256	264	272	279			
BMI	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35			

Source: Evidence Report of Clinical Guidelines on the Identification, Evaluation, and Treatment of Overweight and Obesity in Adults, 1998. NIH/National Heart, Lung, and Blood Institute (NHLBI).

muscle, bone, fat, and other tissues that make up a person's total body weight) and may not be the most appropriate indicator to determine health status for certain groups of people. For example, athletes with dense bones and well-developed muscles or people with large body frames may be obese by BMI standards (i.e., they have BMIs greater than 30) but yet have little body fat. On the other hand, inactive people may seem to have acceptable weights when, in fact, they may have too much body fat. Similarly, a petite gymnast may be considered underweight but not unhealthy (10). BMI, when used for children and adolescents who are still growing (11), pregnant and lactating women, people with large body frames, or petite and highly muscular individuals, should be interpreted cautiously.

How Does BMI Relate to Health?

BMI is generally related to body fat. Higher BMIs usually mean higher body fat (3). As body fat or BMI increases, especially from values equal to or greater than 30, health risks increase (3).

Being overweight (BMI of 25 to 30) or being obese (BMI greater than 30) increases the risk of having high blood pressure, heart disease, stroke, diabetes, certain types of cancer, arthritis, and breathing problems (4-8). Research shows that being obese lowers one's life expectancy (4,9). When overweight or obese people lose weight, they also lower their blood pressure, total cholesterol, LDL (or "bad") cholesterol, increase their HDL (or "good") cholesterol, improve their blood sugar levels, and reduce their amount of abdominal fat (4).

What Research Studies Relate BMI to Diseases and Longevity?

In 1998, the National Institutes of Health issued a report to identify and treat obesity and overweight. Many scientific research studies suggest that weight loss reduces chronic diseases and improves the life span of people who are overweight. This report provided recommendations to clinicians and the public about weight management (3). In developing this report, more than 43,627 research articles were obtained from a search of the scientific literature and reviewed by a panel of researchers. Researchers have examined the importance of weight reduction in people with high blood cholesterol (4), high blood pressure (5), diabetes (6), cancer (7), and osteoarthritis (8), and reported that weight loss reduces the risks for these diseases.

Conclusions

The link between BMI and health shows that overweight or obese people are more likely than those at normal weight to have medical problems such as high blood pressure, high cholesterol, stroke, diabetes, and heart disease. Research studies have shown that even a weight loss of 1-2 pounds per week for 6 months can improve the health of overweight people (3). The goal of weight loss should be to improve health. Rapid weight loss, swings in weight, and improper dieting should not be the goal (12,13).

Related Web Sites

You can find more information about BMI, weight, nutrition, and health by visiting the following Web sites:

- American Dietetic Association
<http://www.eatright.org>

- American Heart Association
<http://www.americanheart.org>
- NIH/National Heart, Lung, and Blood Institute
<http://www.nhlbi.nih.gov>
- NIH/National Institutes of Diabetes & Digestive & Kidney Diseases
<http://www.niddk.nih.gov/health/nutrit/win.htm>

References

- Spadano, M.A., Coakley, E.H., Field, A.E., Colditz, G., and Dietz, W.H. The disease burden associated with overweight and obesity. *JAMA* 1999; 282(16):1523-1529.
- National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases), National Task Force on Prevention and Treatment of Obesity. Obesity and Health Risk. *Arch Intern Med* (in press).
- NIH/NHLBI (National Institutes of Health, National Heart, Lung, and Blood Institute). Clinical Guidelines on the Identification, Evaluation and Treatment of Overweight and Obesity in Adults. U.S. Department of Health and Human Services, Public Health Service, 1998.
- Hubert, H.B., Feinleib, M., McNamara, P.M., and Castelli, W.P. Obesity as an independent risk factor for cardiovascular disease: a 26 year follow-up of participants in the Framingham Heart Study. *Circulation* 1983; 67:968-977.
- Walker, S.P., Rimm, E.B., Ascherio, A., Kawachi, I., Stampfer, M.J., and Willett, W.C. Body size and fat distribution as predictors of stroke among US men. *American Journal of Epidemiology* 1996; 144:1143-1150.
- Colditz, G.A., Willett, W.C., Rotnitzky, A., and Manson, J.E. Weight gain as a risk factor for clinical diabetes mellitus in women. *Ann Intern Med* 1995; 122:481-486.
- Giovannucci, E., Ascherio, A., Rimm, E.B., Colditz, G.A., Stampfer, M.J., and Willett, W.C. Physical activity, obesity, and risk for colon cancer and adenoma in men. *Ann Intern Med* 1995; 122:327-334.
- Hochberg, M.C., Lethbridge-Cejku, M., Scott, W.W. Jr., Reichle, R., Plato, C.C., and Tobin, J.D. The association of body weight, body fatness and body fat distribution with osteoarthritis of the knee: data from the Baltimore Longitudinal Study of Aging. *Journal of Rheumatology* 1995; 22:488-493.
- Troiano, R.P., Frongillo, E.A. Jr., Sobal, J., and Levitsky, D.A. The relationship between body weight and mortality: a quantitative analysis of combined information from existing studies. *Int J Obes Relat Metab Disord* 1996; 20:63-75.
- Ellis, K.J. Body composition of a young, multi-ethnic, male population. *American Journal of Clinical Nutrition* 1997; 66:1323-1331.
- Kuczmarski, R.J., Ogden, C.L., Grummer-Strawn, L.M., et al. CDC growth charts: United States. Advance data from vital and health statistics; no. 314. Hyattsville, Maryland: National Center for Health Statistics, 2000.
- Atkinson, H.G., Blackburn, G.B., Anthony, N.D., Arthur, W.F., Harry, L.G., David, S.R., and Carolyn, D.R. Sensible Weight Control. *New England Journal of Medicine: Health News* 1999 (Nov. 20):8.
- Blackburn, G.B. The Physician's Perspective. *New England Journal of Medicine: Health News* 1999 (Nov. 20):2.

Insight 17
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A Look at the Diet of Pregnant Women

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Good nutrition is very important for pregnant women. Deficiency of certain nutrients in the diet can lead to such adverse effects as anemia and fetal neural tube defects. Considerable scientific evidence shows that diet is related to pregnancy outcome and frequency of complications. Demonstrating the importance of good maternal nutrition, the U.S. Department of Agriculture (USDA) administers a Special Supplemental Nutrition Program for Women, Infants and Children (WIC) through which low-income women at nutritional risk who are pregnant or postpartum can obtain healthful foods to supplement their diet. WIC also provides nutrition education and referrals to other services including health care. With the WIC supplemental foods, pregnant women should be able to meet all their nutritional needs. With WIC vouchers, participants can buy milk, cheese, cereals, fruit juices, dried beans, and selected other foods. Recently some WIC programs have started providing vouchers for fresh fruits and vegetables through a farmer's market program.

To examine the nutrient status of WIC participants, the USDA Center for Nutrition Policy and Promotion (CNPP) has conducted a study of the dietary intake of participants. The study, *Review of the Nutritional Status of WIC Participants* (CNPP, 1999), revealed that pregnant and postpartum women were not consuming the recommended amount of several

important nutrients, including iron, calcium, folic acid, zinc, and magnesium. That research is extended here to examine the quality of the diet by assessing consumption of milk products, grains, fruits, vegetables, and meat—the five food groups of the USDA's Food Guide Pyramid (USDA, 1992) and how well recommendations for total fat, saturated fat, cholesterol, and sodium intake are met. This *Nutrition Insight* describes the diet of pregnant women participating in the WIC program and low-income and higher income women.

The Food Guide Pyramid and Special Considerations for Pregnant Women

The number of servings of the Pyramid food groups consumed have now been calculated for respondents to the Third National Health and Nutrition Examination Survey 1988-94 (NHANES III) as a part of the calculation of Healthy Eating Index (HEI) scores (National Center for Health Statistics). Pregnant women can use the numbers of servings of food groups recommended by the Food Guide Pyramid (3 servings of milk products) as a start for planning a healthy diet. Women should consult their health care provider for individual advice.

Pyramid Food Group Servings

Figure 1 shows the average number of servings of each of the Pyramid food groups by pregnant women in NHANES III: those participating in the WIC program, those not participating in WIC with income less than 185 percent of the nationally adjusted Federal poverty level (the cutoff value for participation in WIC programs), and those with income at or above 185 percent of the poverty level. (All results reflect population-weighted values.) Differences in mean number of servings consumed were statistically significant for vegetables and milk products. The above poverty group ate significantly more vegetables (3.1 servings) than did the non-WIC below poverty group (2.1 servings). WIC participants consumed significantly fewer servings of milk (2.3) than the above poverty pregnant women consumed (3.2). For fruits and vegetables, the WIC participants appear more comparable to the above poverty group and consume more than the non-WIC below poverty group.

The Food Guide Pyramid makes recommendations on numbers of servings for different energy intake levels, with specific advice for pregnant women to consume 3 servings of milk. Table 1 shows recommended servings at three calorie levels from the Pyramid. USDA suggests active, non-pregnant women consume about 2,200 kilocalories per day (USDA, 1992). All groups of pregnant women in NHANES III consumed less than the recommended number of Pyramid servings based on a 2,200 kilocalorie diet.

Fat, Saturated Fat,Cholesterol, and Sodium Intake

General recommendations for limiting intake of fat, cholesterol, and sodium are the same for pregnant women as for the general population (USDA and

Figure 1. Mean number of servings eaten in 1 day for five food groups: Pregnant women

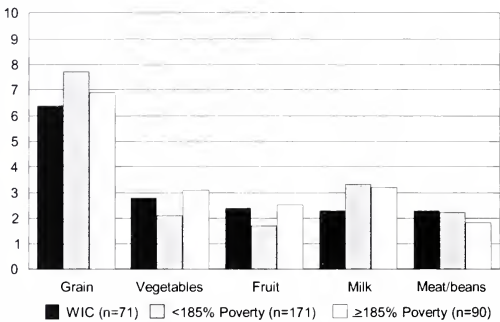


Table 1. Food Guide Pyramid recommended servings for 3 sample calorie intake levels

	Calorie level		
	1,600	2,200	2,800
Bread (grain) group	6	9	11
Vegetable group	3	4	5
Fruit group	2	3	4
Milk group (pregnant women)	3	3	3
Meat group (ounces)	5	6	7

USDHHS, 1995). All groups of pregnant women in this study consumed more than the recommended percentage of calories from fat and saturated fat (table 2). Pregnant women in the WIC program consumed lower percentages of total calories from fat, saturated fat, and cholesterol than did both the low-income pregnant women and women above 185 percent of the poverty level. Reference values for intake of cholesterol and sodium are based on the *Daily Values* from Nutrition Facts Labeling. All groups exceeded the sodium reference value, and only the

non-WIC below 185 percent of the poverty group exceeded the reference intake value for cholesterol. The below poverty group consumed significantly more cholesterol than the above 185 percent of poverty group (table 2, 317 mg vs. 237 mg).

Nutrient Supplementation

Prenatal supplements are routinely recommended for pregnant women. Considerable evidence shows that periconceptional use of folate or

Table 2. Fat, saturated fat, cholesterol, and sodium intake in 1 day

	Reference value	WIC participants	Below 185% poverty (not on WIC)	Above 185% poverty
% calories from fat	<30%	32.6	34.2	36.2
% calories from saturated fat	<10%	12.1	12.8	13.1
Cholesterol (mg)	<300 ^b	273	317 ^a	237 ^a
Sodium (mg)	<2400 ^b	3593	3940	3372

^a $p < .05$.

^b Based on *Daily Value* from Nutrition Facts Labeling.

Table 3. Average percentage of groups of pregnant women who took supplements at least once a day for at least 1 month

Daily supplement use	WIC participants	Below 185% poverty	Above 185% poverty
Took a multivitamin with any iron	43	52	64
Took a multivitamin with at least 30 mg iron	42	47	36
Took a multivitamin with any folic acid	41	55	63
Took a multivitamin with at least 400 mcg folic acid	41	55	63

multivitamins protects against the occurrence of fetal neural tube defects. Additional iron requirements in pregnancy cannot be met through diet alone and should be attained through supplements containing iron. More iron is needed for both fetal demands and the large increase in maternal blood volume.

Respondents in NHANES III were asked detailed questions about supplement use. A large percentage of all three groups of pregnant women did not report taking daily supplements containing iron and folate for at least 1 month (table 3).

References

- Kramer-LeBlanc, C.S., Mardis, A.L., Gerrior, S.A., and Gaston, N.W. 1999. *Review of the Nutritional Status of WIC Participants: Final Report*. U.S. Department of Agriculture, Center for Nutrition Policy and Promotion.
- National Research Council, Commission on Life Sciences, Food and Nutrition Board, Subcommittee on the Tenth Edition of the RDAs. 1989. *Recommended Dietary Allowances*, 10th ed. National Academy Press, Washington, DC.
- U.S. Department of Agriculture, Human Nutrition Information Service. 1992. *The Food Guide Pyramid*. Home and Garden Bulletin No. 232.
- U.S. Department of Agriculture and U.S. Department of Health and Human Services. 1995. *Nutrition and Your Health: Dietary Guidelines for Americans, Fourth Edition*. Home and Garden Bulletin No. 252.

Food Insufficiency and the Nutritional Status of the Elderly Population

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Studies have shown that food insufficiency, defined as "an inadequate amount of food intake due to lack of resources" (1), is found in the U.S. population of all ages. A few reports have shown that food insufficient people eat less than the food sufficient population, but no studies have reported on the overall nutritional status of food insufficient people. Therefore, using data from the third National Health and Nutrition Examination Survey (NHANES III), we compared the nutritional status of food insufficient versus food sufficient people 65 years of age and over. The results of our analysis provide a glimpse of the potential differences in nutritional status between food sufficient and insufficient individuals.

Data

NHANES III, conducted between 1988 and 1994 by the National Center for Health Statistics of the Centers for Disease Control and Prevention, was a cross-sectional representative sample of the U.S. noninstitutionalized population (2). The goal of the survey was to collect national health and nutrition data to estimate the prevalence and distribution of selected diseases and risk factors.

Food sufficiency status of survey participants was determined by asking them whether the food eaten by them and/or their families was "... enough food to eat, sometimes not enough food to eat, or often not enough to eat." The respondents were considered to be food insufficient if they responded positively to "sometimes not enough food to eat," or "often not enough to eat."

In this study, we examined differences in nutritional status between food sufficient and insufficient people by using information on dietary intake, blood levels of vitamins and minerals, measured body weight and height, and by a self-reported health assessment. Data of 3,885 people 65 years of age and over who had complete dietary information were used in this study. The number of food insufficient older people was small ($n=113$), which prevented detailed analysis. However, mean nutrient values from food and from blood were tested for significant differences between the two groups, after taking into account the survey's study design and applying appropriate population weights. Also, we compared the distributions of sociodemographic characteristics such as household income, age, gender, marital status, education, body composition measures, and self-reported health status. All reported differences were statistically

significant at the 0.05 level. Because of the relatively small number of individuals from food insufficient households, the results should be viewed with some caution. We present these results in table 1.

Demographic Information

The mean age of this population group was 72.3 years. No significant age differences were found between food sufficient and insufficient groups. About 48 percent of the population were men and 52 percent were women. There were no differences in gender distribution between the two groups. However, food sufficient people were more likely to be married and had a significantly higher number of years of education.

Nutrition Assessment

Dietary Intake: Food intake was measured by collecting a 24-hour dietary recall. Food insufficient older people had significantly lower mean intake of calories and the macronutrients: protein, fat, and carbohydrate. They also had lower mean intake of some B vitamins (thiamin, niacin, vitamin B₆, folacin, vitamin B₁₂) and the minerals: iron and zinc. These vitamins and minerals are important to the immune system and cognitive function. Therefore, individuals deficient in these vitamins and minerals may be more prone to infections and may have a higher risk of chronic diseases and cognitive dysfunction (3). Analysis of food group intake indicated that food insufficient people ate significantly fewer servings of meat and vegetables and had a significantly lower variety of foods eaten.

Table 1. Statistically significant ($P < 0.05$) mean differences by food sufficiency status

Characteristics	Sufficient N = 3,768	Insufficient N = 113
Demographics		
BMI < 19 (%)	3	14
Health is poor (%)	30	65
Under 130% of poverty (%)	21	79
Married (%)	57	31
Schooling (years)	11.0	7.7
Dietary assessment		
Kcalories	1699	1421
Protein (g)	67.2	56.6
Carbohydrate (g)	216	185
Fat (g)	62.5	52.1
Thiamin (mg)	1.56	1.28
Niacin (mg)	20.8	16.0
B ₆ (mg)	1.82	1.35
Folacin (μg)	299	222
B ₁₂ (μg)	4.6	3.3
Iron (mg)	14.9	10.6
Zinc (mg)	10.6	7.6
Meat (servings)	1.7	1.4
Vegetables (servings)	3.2	2.3
Variety (score 0-10)	8.1	6.5
Serum levels		
Folate (nmol/L)	22.4	14.2
Vitamin C (mmol/L)	51.1	35.7
Vitamin E (μmol/L)	33.2	27
Beta carotene (μmol/L)	0.5	0.4
Cryptoxanthin (μmol/L)	0.18	0.15
Lutein/Zeaxanthin (μmol/L)	0.44	0.38

Source: Third National Health and Nutrition Examination Survey.

Biochemical Assessment: The serum of survey participants was measured for several vitamins and minerals. People who reported being food insufficient had significantly lower serum levels of folate; the antioxidant nutrients vitamin C and vitamin E; and the carotenoid components β-carotene, cryptoxanthine, and lutein/zeaxanthin. Antioxidants are believed to be associated with the prevention and delay of chronic diseases, such as cataracts and possibly cancer and heart disease, by fighting the damaging effects of oxidation to the

body (4). Also, low levels of folic acid and other B vitamins may result in an accumulation of homocysteine in the body, which has been strongly linked to an increased risk in cardiovascular disease (5,6).

Body Composition Measurements: Body mass index (BMI), an indicator of body fat, is calculated using measured body weight and height. The results of this study indicate that those individuals in the food insufficient group were at higher risk of having a BMI below 19,

a level considered as underweight. Studies have shown a higher prevalence of early mortality among elderly people in the underweight category (7). This increased mortality may be an outcome of a lower resistance to diseases but was also attributed to other causes such as inclusion of smokers and people in poor health in the underweight category. No significant differences were found in the proportion of obese people (BMI>30.0) in the two groups.

Self-reported Health: Self-reported health represents physical, emotional, and social aspects of health and well-being and correlates highly with the risk of mortality (8). Therefore, we used this variable as a proxy for clinical data. Compared with food sufficient people, those who were food insufficient reported more frequently being in fair or poor health versus excellent, very good, or good.

Poverty and Food Insufficiency

There is a strong relationship between food insufficiency and poverty. Seventy-nine percent of food insufficient people in this survey had an income below 130 percent of the poverty level (the cutoff for food stamp eligibility). However, food insufficiency is not limited to poor people. Among the elderly, other factors may contribute to food insufficiency, such as decreased mobility, inability to care for oneself, and limited help with daily activities. All these factors may contribute to the inability to purchase and prepare food and consequently lead to food insufficiency.

Overall Findings

The results, overall, indicate the following for older people who reported food insufficiency: lower mean intake of several nutrients, lower intake of the vegetable and meat groups, lower dietary variety, lower mean serum levels of certain nutrients, higher risk of being underweight, and in poor or fair health (table 1).

Considering that older people are at risk of malnutrition, our results indicate that food insufficient elderly people are an especially vulnerable population. If all older people are to maintain or acquire a healthful lifestyle, then outreach to the food insufficient elderly must be developed and implemented. Also, gaps in the safety net must be identified and remedied and food assistance and nutrition education efforts improved.

References

1. Briefel, R.R. and Wotecki, C.E. 1992. Development of the food sufficiency questions for the Third National Health and Nutrition Examination Survey. *Journal of Nutrition Education* 24:24S-28S.
2. Plan and Operation of the Third National Health and Nutrition Examination Survey, 1988-1994. 1994. *Vital Health Statistics* (1):No. 32. DHHS publication PHS 94-1308.
3. Chandra, R.K. 1997. Nutrition and the immune system: An introduction. *American Journal of Clinical Nutrition* 66(2):460S-463S.

4. Stahelin, H.B. 1999. The impact of antioxidants on chronic disease in aging and in old age. *International Journal of Vitamin Nutrition Research* 69:146-149.

5. Selhub, J., Jacques, P.F., Wilson, P.W.F., Rush, D., and Rosenberg, I.H. 1993. Vitamin status and intake as primary determinants of homocysteinemia in an elderly population. *JAMA* 270:2693-2698.

6. Boushey, C.J., Beresford, S.A.A., Omenn, G.S., and Motulsky, A.G. 1995. A quantitative assessment of plasma homocysteine as a risk factor for vascular disease. Probable benefits of increasing folic acid intakes. *JAMA* 274:1049-1057.

7. Kushner, R.F. 1993. Body weight and mortality. *Nutrition Review* 51(5):127-136.

8. Idler, E.L. and Benyamini, Y. 1997. Self-reported health and mortality: A review of twenty-seven community studies. *Journal of Health Social Behavior* 38:21-37.

Research and Evaluation Activities in USDA

From the Food Surveys Research Group, Beltsville Human Nutrition Research Center, Agricultural Research Service

Do People Really Know How Much They Eat?

How well are people able to report amounts of foods they eat? This question forms the basis of research conducted to improve the accuracy of information about the types and amounts of foods eaten by Americans. This information is collected in periodic USDA food consumption surveys that date back to the 1930's. The most recent nationwide dietary survey conducted by USDA is the 1994-96, 1998 Continuing Survey of Food Intakes by Individuals (CSFII).

The USDA has been a leader in the development of methods to help people more accurately recall and report what they eat. Research supported by USDA in the early 1980's demonstrated that, for dietary recalls administered specifically in the home, common household measuring utensils are potentially more helpful than abstract three-dimensional food models.

Food preferences and sizes of food portions have changed over the years. Ethnic foods and one-dish meals have grown in popularity; typical portions served in food establishments are reported to be increasing. For example, larger- or super-sized servings of beverages and french fries have

become a mainstay on menus in fast-food restaurants. Many food choices today come in a variety of sizes—from bite-size to fun-size to king-size. Larger portions and the use of multiple servings during a meal add to the complexity, and emphasize the necessity, of collecting amounts accurately. At the same time, foods being consumed in smaller portions by weight- and health-conscious people must also be estimated accurately.

Food Model Booklet

As portions and preferences are changing, so are the methods used to conduct nationwide food surveys. In-home collection of in-person dietary data is not the only means of gathering this type of information about Americans. The Food Surveys Research Group (FSRG) has been conducting research on collecting dietary data by telephone. Telephones provide an economical and valid means for gathering such data if response rates can be maintained by notifying respondents in advance about participating in the study. As part of the research program to adapt new collection methods, FSRG has developed an easy-to-use *Food Model Booklet* that incorporates high-tech graphics and research on how people perceive quantities and on what is and is not helpful.

The *Food Model Booklet* contains 30 life-size pictures ranging from two-dimensional drawings of typical household food containers (e.g., glasses, cups, and bowls) to more creative drawings of geometric shapes (e.g., amorphous mounds, wedges having a moveable arrow to denote sizes, concentric circles, and a grid). In previous CSFII surveys, interviewers

used measuring cups and spoons and a ruler to help survey respondents recall portion sizes of foods they ate. With the addition of the *Food Model Booklet*, respondents now have more ways to estimate amounts, thus making it easier for them and more accurate. It also allows for data collection via the telephone.

USDA has placed a priority on improving portion-size estimation aids through an 1890 Capacity Building Grant that was under the direction of Dr. Sandria Godwin at Tennessee State University in collaboration with Dr. Edgar Chambers IV at Kansas State University. The research has focused on identifying the cognitive strategies people use in reporting food amounts and on developing novel measurement aids. Aids were found to help in formulating memory recall and in setting boundaries for visualization and comparison. The research has shown that people prefer aids that are similar in size and shape to actual household containers—a finding that FSRG has implemented in developing the *Food Model Booklet*. The research also has demonstrated that estimates of relative size (i.e., small, medium, and large) are effective for some difficult-to-measure foods.

Development of the *Food Model Booklet* involved graphic design and computer power precision to draw the two-dimensional models to life-size depiction and accurate volume capacity. But development did not stop there. An accuracy test was conducted with 264 adults to assess how accurately people estimated amounts of 17 commonly eaten foods such as: spaghetti, pizza, cola, meatloaf, and potato salad. The

participants estimated the amount of each food by using a two-dimensional model from the *Food Model Booklet* and typical measuring aids (including measuring cups and spoons and a ruler). The results: Overall, people estimated serving sizes as well with the *Food Model Booklet* as with other measuring aids. And, estimates improved by about one-third with the "mound" models, compared with the measuring cups.

The *Food Model Booklet* is but one answer to ensuring that respondents can accurately report how much they eat. Dietary recalls were administered in a nationwide pilot study of nearly 800 individuals of all ages. The *Food Model Booklet* was used as one of the measurement aids in addition to measuring cups and spoons and a ruler. Only 17 percent of the food portions reported were estimated by the assistance of the *Food Model Booklet*. Most food portions were reported with descriptions such as "large, medium, thin slice, and can of soda," as well as cups or spoons. In many cases, the name of the item, such as Big Mac® or Fig Newtons®, is directly associated with a known weight, so only the number eaten needs to be reported. Also, many foods come prepackaged with labels showing the quantities.

Hence the marketplace is another important source for determining portion sizes.

The *Food Model Booklet* does not rely on providing actual measures or amounts of food. It is designed so that a respondent does not need to know how much of a food he or she consumed in terms of a measurement but rather in terms of visualizing the amount in relation to the model. FSRG has plans underway to make the *Food Model Booklet* more consumer-friendly by including not only all the food models but also including corresponding measures and selected nutrient values for frequently consumed foods. FSRG believes that this consumer publication will be a valuable nutrition education tool for Americans interested in portion sizes and will be responsive to the need for visual references that help Americans identify food amounts.

The New USDA Automated Multiple-Pass Method

The development of the *Food Model Booklet* is only part of the effort to improve dietary surveys that has been underway in FSRG for the past 4 years. An expanded and improved method of questioning that helps survey respon-

dents remember the foods they ate has been completed and automated. The whole dietary interview has been computerized (including the questions, prompts, and details about the food and how it is prepared). The new method is called the USDA Automated Multiple-Pass Method. It relies on a number of built-in cues and specially sequenced questions to help jog the respondents' memory. The *Food Model Booklet* is an integral part of the new method.

The new USDA Automated Multiple-Pass Method will be used in a dietary survey, to be launched in 2002, which will integrate the USDA food survey with the National Health and Nutrition Examination Survey (NHANES) that is directed by the National Center for Health Statistics (NCHS) of the U.S. Department of Health and Human Services. USDA will provide the instrument and be responsible for compiling and processing the dietary data. USDA and NCHS will work cooperatively to release the dietary data from the integrated survey.

Survey Results

Results from the 1994-96, 1998 Continuing Survey of Food Intakes by Individuals are available in several formats:

- The microdata (raw) are available on a two-disk CD-ROM set. The CD-ROM provides complete documentation needed for using the data, including SAS programs to read the data and create system files, and both annual and multi-year sampling weights. The CD-ROM also includes the technical support databases—food codes, nutrient values, and recipes. The CD-ROM is available from the National Technical Information Service at 1-800-553-6847. Accession number PB2000-500027.
- The Web site for the Food Surveys Research Group at www.barc.usda.gov/bhnrc/foodsurvey/home.htm includes 19 table sets with summary statistical results from the survey, as well as copies of the questionnaires, interviewer manuals, and a report on the design and operation of the survey.
- Formal survey reports are available from the National Technical Information Service at 1-800-553-6847. (Most of the data in these reports are available on the FSRG Web site; however, the formal reports include standard errors not available in all table sets.)
 - Design and Operation: The Continuing Survey of Food Intakes by Individuals and the Diet and Health Knowledge Survey, 1994-96. NFS Rep. No. 96-1, 264 pp. NTIS Accession No. PB98-137268.*
 - Food and Nutrient Intakes by Individuals in the United States, by Sex and Age, 1994-96, NFS Rep. No. 96-2, 197 pp. NTIS Accession No. PB99-117251. (Table sets 8, 9, 10, and 12.*)
 - Food and Nutrient Intakes by Individuals in the United States, by Income, Food Stamp Program Participation, Race, Hispanic Origin and Race, and Region, 1994-96, NFS Rep. No. 96-3, Volumes 1 and 2, 771 pp. NTIS Accession No. PB2000-107886. (Table sets 11, 13, 14, 15, and 16.*)
 - Results from USDA's 1994-96 Diet and Health Knowledge Survey, NFS Rep. No. 96-4, NTIS Accession No. PB2001-104879. (Table set 19.*)

*Available on the FSRG Web site, as indicated.

Federal Studies

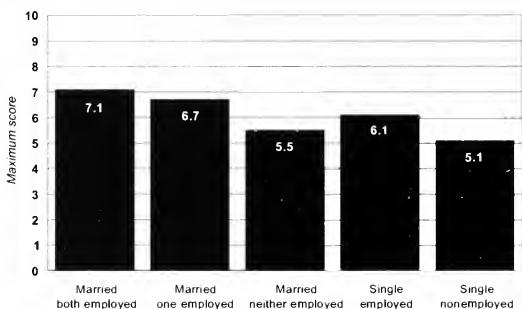
A Child's Day: Home, School, and Play (Selected Indicators of Child Well-Being)

This report presents findings from the Survey of Income and Program Participation (SIPP) on the well-being of American children. A variety of indicators are used to portray children's experiences while growing up. Data on child well-being were collected by interviews of households participating in the 1992 and 1993 SIPP panels, which were conducted at the same time in the fall of 1994. The topics covered illustrate what children experience on a daily basis, including differences in family living arrangements, economic and social environments, and the types of neighborhoods where children live. Experiences with nonparental child care arrangements, daily interactions with parents, performance in school, and participation in extracurricular activities are other indicators of child development and future well-being.

Dual-income married couples with children consider their neighborhoods to have higher levels of safety

On a scale of 0 to 10, where a value of 10 is the best possible rating of a parent's views about his or her neighborhood and community, the average value was 6.6 for all parents with children in the household. The neighborhood/community index is higher for children in married-couple families where both parents work than for other children. Index scores are lower for single-parent households and households where the parents are not working.

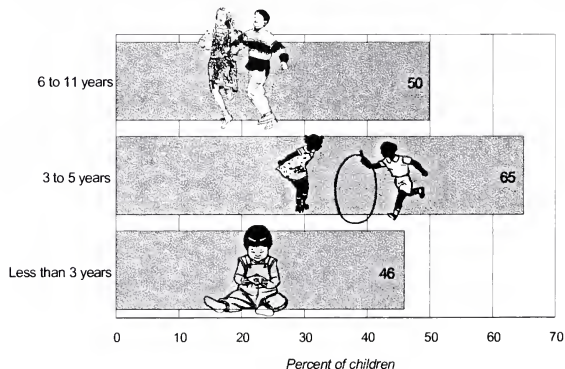
Average scores for perception of neighborhood safety and trust, by marital and employment status of parents, fall 1994



Just over half of children under age 12 have been in child care

In the fall of 1994, 20.2 million children (53 percent) under age 12 have been cared for regularly by someone other than their immediate family. Among children less than 3 years old, 46 percent had been in a regular child care arrangement, compared with 65 percent of 3- to 5-year-olds and 50 percent of 6- to 11-year-olds.

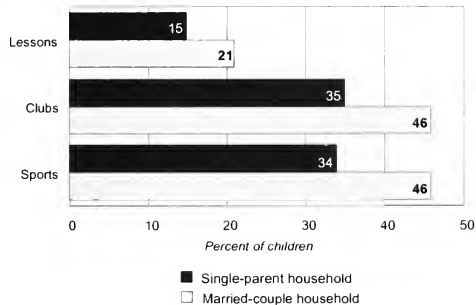
Children ever in child care arrangement, by age of child, fall 1994



Household structure shapes children's involvement in extracurricular activities

Children's participation in sports and clubs and enrollment in lessons are consistently higher for children in married-couple families. Among children 12 to 17 years old, 46 percent with married parents participated in sports, compared with 34 percent of children with separated, divorced, or widowed parents.

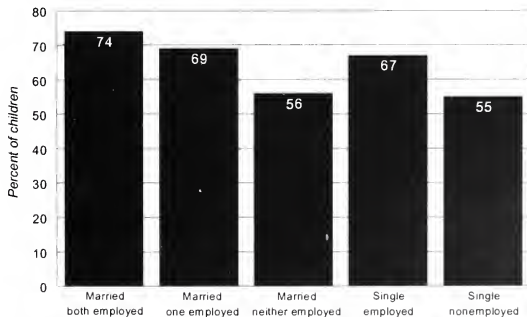
Children 12 to 17 years old involved in extracurricular activities, by household type, fall 1994



Children with married, working parents are most likely to be academically on-track

About three-quarters of children whose parents were both married and employed were academically on-track (i.e., enrolled at or above the modal grade for their age). Among children in single-parent households, those with an employed parent generally progressed more steadily in school (67 percent on-track) than those without an employed parent (55 percent on-track).

Children 12 to 17 years old academically on-track, by marital and employment status of parents, fall 1994



Source: Fields, J., Smith, K., Bass, L.E., and Lugaila, T., 2001. *A child's day: Home, school, and play* (selected indicators of child well-being). Current Population Reports, Household Economics Studies, P70-68, U.S. Census Bureau.

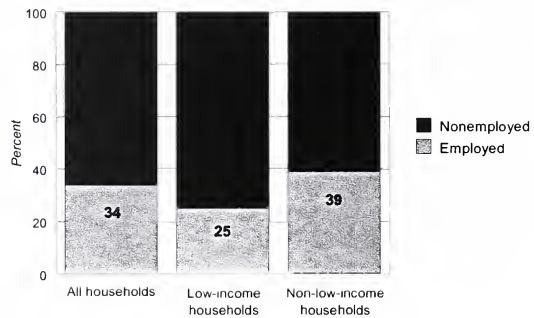
Teenagers: Employment and Contributions to Family Spending

Although teenagers are a major expense, they can offset some of their expense as well as contribute toward their family's economic well-being by being employed in the labor market and contributing to the family budget. This study examines the connection between the employment status of teenagers (ages 14 to 17) and family expenditures by using data from the 1997-98 Consumer Expenditure Survey. It examines the role of employed and nonemployed teenagers in family expenditures, and specifically looks at the percentage of teenagers who are employed and not employed, and the characteristics of each. This analysis is done by income level because children from low-income families may be more likely to contribute to family economic well-being than children from non-low-income households. In addition, the association of teen employment with major family expenses is analyzed.

A higher percentage of teenagers from non-low-income households are employed

Among all teenagers, 34 percent were employed sometime during the year, with average annual earnings of \$2,270. For teenagers in low-income families, 25 percent were employed, with average annual earnings of \$1,980. For teenagers in non-low-income families, 39 percent were employed and had average annual earnings of \$2,380.

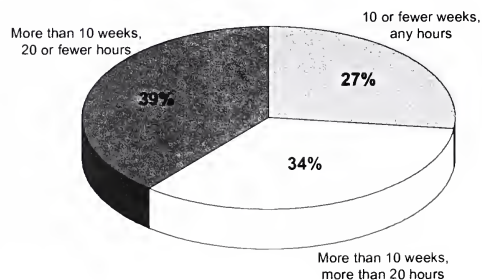
Employment of teenagers, by household income, 1997-98



Nearly a third of employed teenagers work more than 10 weeks per year and more than 20 hours per week

Of all employed teenagers, 27 percent worked 10 or fewer weeks per year for any amount of time (likely indicating summer employment), 39 percent worked more than 10 weeks per year and 20 or fewer hours per week, and 34 percent worked more than 10 weeks per year and more than 20 hours per week. Some researchers suggest that there are negative consequences to working more than 20 hours per week for teens, such as lower educational attainment.

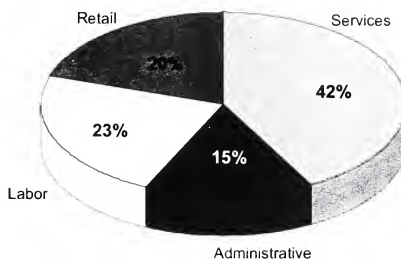
Weeks worked per year and hours worked per week by employed teenagers, 1997-98



Service sector is major employer of teenagers

Many teenagers work in the service sector. Among all teenagers, 42 percent worked in the service sector (e.g., waiter or waitress), 23 percent as laborers (e.g., yard work), 20 percent in retail (e.g., sales associate), and 15 percent in administrative work (e.g., secretarial or clerical). Type of employment did not vary that much between teens in low- and non-low-income households.

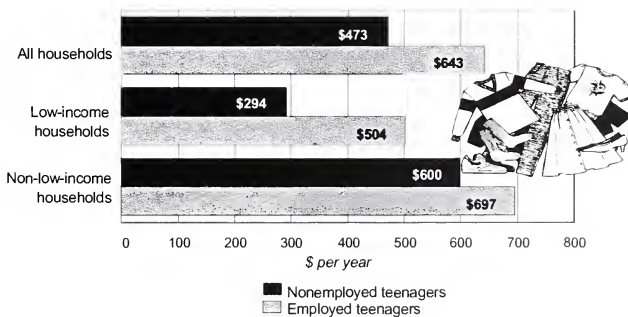
Type of employment of teenagers, 1997-98



Clothing expenses higher for employed teenagers

The clothing expenses of employed teenagers are higher than those of nonemployed teenagers (\$643 vs. \$473 per year). This held for teenagers in low- and non-low-income households. It seems that a large part of the earnings of teenagers is spent on themselves and does not go toward general household expenditures.

Clothing expenses of teenagers, by household income, 1997-98



Source: Johnson, D.S. and Lino, M., 2000, *Teenagers: Employment and contributions to family spending*, *Monthly Labor Review* 123(9):15-24.

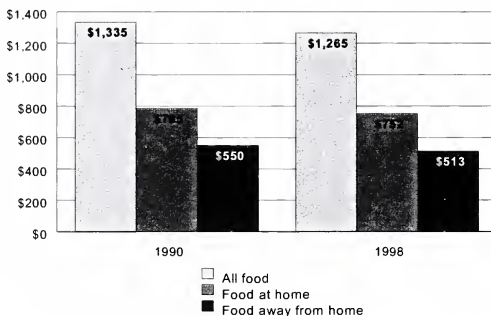
Food Spending by U.S. Households Grew Steadily in the 1990's

The average U.S. household spent about \$2,037 per person on food in 1998, up 17 percent from the average expenditure in 1990. Food purchased at supermarkets and other food stores (i.e., food at home) rose 18 percent from 1990 to 1998, while expenditures for eating out (i.e., food away from home) rose about 15 percent. Most of the increase for food at home was for cereal and bakery products (up 22 percent), fruits and vegetables (up 22 percent), sugar and sweets (up 34 percent), and miscellaneous foods (up 25 percent). These findings are compiled from information contained in the Consumer Expenditure Survey released by the Bureau of Labor Statistics from 1990 through 1998.

In inflation-adjusted dollars, consumers spent less on food in 1998 than in 1990

In 1990 the average per capita expenditure on food was \$1,335 (\$785 on food at home and \$550 on food away from home). In 1998 the average inflation-adjusted (converted to 1990 dollars) per capita expenditure on food was \$1,265 (\$752 on food at home and \$513 on food away from home)—about a 5-percent decrease.

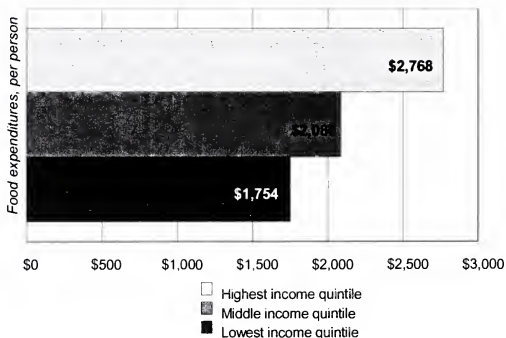
Per capita food expenditures (1990 dollars)



Low-income households continue to spend less per person

Households tend to spend more for food as incomes rise, because they buy higher quality food items, more convenience foods, and more food away from home. In 1998 low-income households (those in the lowest income quintile, with before-tax incomes averaging \$7,306) spent \$1,754 per person on food, about 37 percent less than the \$2,768 per person spent by the wealthiest households (those in the highest income quintile, with before-tax incomes averaging \$98,310).

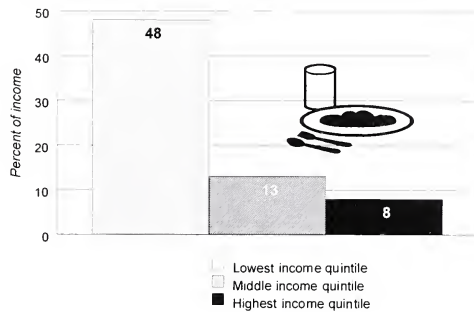
Per capita food spending, by income quintile, 1998



Percentage of income spent on food declines as income rises

While the amount spent on food increases with household income, the percentage of income spent on food decreases as income rises. In 1998 low-income households spent about 48 percent of their income on food, while other income groups spent much less. Middle-income households spent about 13 percent, and the wealthiest households spent about 8 percent, figures fairly constant over the 1990's.

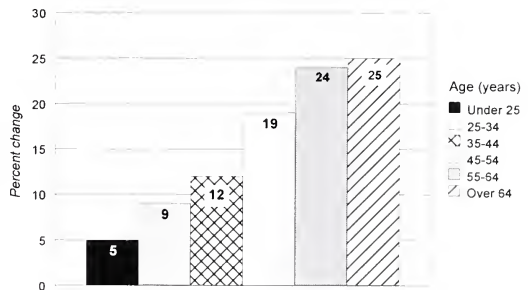
Income spent on food, by income quintile, 1998



Older households experienced the largest percentage increase in food spending

Households headed by people over age 64 increased their per person food spending between 1990 and 1998 by 25 percent, the highest percentage change of any age group. Households headed by people under age 25 experienced a 5-percent increase per person, and those headed by people between ages 25 to 34 experienced a 9-percent increase per person.

Change in per person food spending, by age, 1990-98



Source: Blisard, N., 2000, Food spending by U.S. households grew steadily in the 1990's, FoodReview 23(3):18-22.

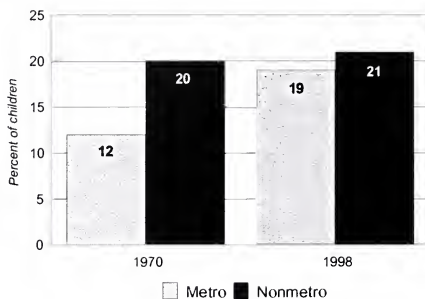
Factors Affecting High Child Poverty in the Rural South

Child poverty in the 1990's remained high, especially in the rural South. In 1998 the poverty rate for children (under age 18) in the rural South was nearly 27 percent, compared with 17 percent for rural children in the rest of the Nation. A higher proportion of poor children in the rural South are in severe poverty, a level of family income under 50 percent of the poverty level. Poor children are more likely to live in mother-only families; to be Black; and to have parents who are younger, less educated, and not employed. The composition of the population of the rural South contributes to the high child poverty in the region.

Child poverty historically higher in rural areas

Child poverty has historically been higher in rural areas than in urban areas, especially in the South. In 1970 the child poverty rate was 12 percent in metro areas and 20 percent in nonmetro areas. By 1998 the metro child poverty rate increased to 19 percent and the nonmetro child poverty rate increased slightly to 21 percent.

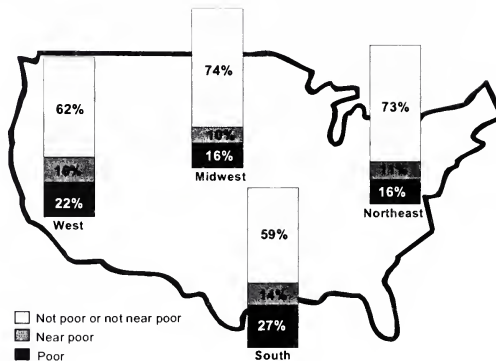
Poverty status of children by metro-nonmetro status, 1970 vs. 1998



Child poverty is higher in the rural South

Child poverty is more pervasive in the rural South than in other rural areas. In 1998, 27 percent of children in the nonmetro South were poor, compared with 16 percent of children both in the nonmetro Northeast and Midwest and 22 percent of children in the nonmetro West. A higher percentage of rural Southern children were also near poor (in families with incomes 100-149 percent of the official poverty threshold), compared with children in the rural Midwest and Northeast.

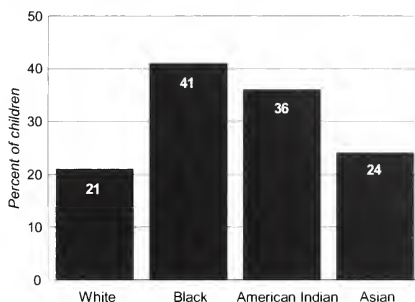
Poverty status of nonmetro children by region, 1998



Non-White children in the rural South more likely to be poor than are White children

The poverty rate for White children in the rural South was 21 percent in 1998. By contrast, the poverty rate for non-White children in the rural South was higher—41 percent for Black children, 36 percent for American Indians, and 24 percent for Asians. Black children's poverty rate was nearly twice the rate for White children in rural areas.

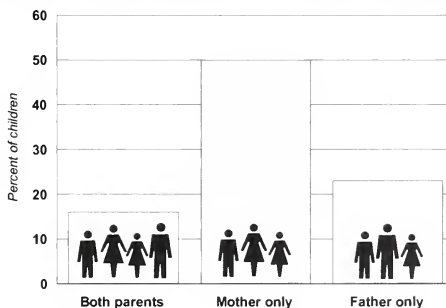
Poverty rate for nonmetro Southern children by race, 1998



Children in mother-only families in the rural South also more likely to be poor

Family structure has an enormous effect on the well-being of children in the rural South. A higher percentage of rural Southern children in mother- and father-only families (50 and 23 percent, respectively) live in poverty, compared with children in two-parent families (16 percent). In one-parent families, only a single parent generates income, and that effort is constrained by child care arrangements.

Poverty rate for nonmetro Southern children by family structure, 1998



Source: Rogers, C.C., 2001, *Factors affecting high child poverty in the rural South*, *Rural America* 15(4):50-58.

Journal Abstracts

The following abstracts are reprinted verbatim as they appear in the cited source.

Alaimo, K., Olson, C.M., Frongillo Jr., E.A., and Briefel, R.R. 2001. Food insufficiency, family income, and health in US preschool and school-aged children. *American Journal of Public Health* 91(5):781-786.

Objectives. This study investigated associations between family income, food insufficiency, and health among US preschool and school-aged children.

Methods. Data from the third National Health and Nutrition Examination Survey were analyzed. Children were classified as food insufficient if the family respondent reported that the family sometimes or often did not get enough food to eat. Regression analyses were conducted with health measures as the outcome variables. Prevalence rates of health variables were compared by family income category, with control for age and gender. Odds ratios for food insufficiency were calculated with control for family income and other potential confounding factors.

Results. Low-income children had a higher prevalence of poor/fair health status and iron deficiency than high-income children. After confounding factors, including poverty status, had been controlled, food-insufficient children were significantly more likely to have poorer health status and to experience more frequent stomachaches and headaches than food-sufficient children; preschool food-insufficient children had more frequent colds.

Conclusions. Food insufficiency and low family income are health concerns for US preschool and school-aged children.

Benartzi, S. and Thaler, R.H. 2001. Naive diversification strategies in defined contribution saving plans. *The American Economic Review* 91(1):79-98.

There is a worldwide trend toward defined contribution saving plans and growing interest in privatized Social Security plans. In both environments, individuals are given some responsibility to make their own asset-allocation decisions, raising concerns about how well they do at this task. This paper investigates one aspect of the task, namely diversification. We show that some investors follow the "1/n strategy": they divide their contributions evenly across the funds offered in the plan. Consistent with this naive notion of diversification, we find that the proportion invested in stocks depends strongly on the proportion of stock funds in the plan.

Bissonnette, M.M. and Contento, I.R. 2001. Adolescents' perspectives and food choice behaviors in terms of the environmental impacts of food production practices: Application of a psychosocial model. *Journal of Nutrition Education* 33:72-82.

The objective of this study was to investigate adolescents' perspectives about the environmental impacts of food production practices and whether these perspectives are related to their food choice. Food choice was operationalized as consumption and purchase of organic foods and locally grown foods. A survey questionnaire was administered to a convenience sample of adolescents and analyzed for descriptive information and relation-

ships among variables. Subjects were 651 ethnically diverse, urban and suburban high school senior students in a major metropolitan area. Variables of an Expanded Theory of Planned Behavior were measured including beliefs, attitudes, perceived social influences, motivation to comply, perceived behavioral control, self-identity, perceived responsibility, behavioral intention, and behavior. Descriptive statistics, Pearson correlation coefficients, and stepwise multiple regression analyses were used. Surveyed adolescents did not have strong or consistent beliefs or attitudes about the environmental impact of food production practices. Cognitive-motivational processes were at work, however, since their perspectives were significantly correlated with behavioral intentions and food choice behaviors. Behavioral intention was best accounted for by attitudes and perceived social influences (and perceived responsibility for organic food), and behavior was best accounted for by behavioral intentions, beliefs, and perceived social influences (and self-identity for local food). There is a need to make salient to adolescents the environmental impact of food production practices through both cognitive and experiential approaches.

Kennedy, E.T., Bowman, S.A., Spence, J.T., Freedman, M., and King, J. 2001. Popular diets: Correlation to health, nutrition, and obesity. *Journal of the American Dietetic Association* 101:411-420.

The objective of this study was to examine the association between a range of health and nutrition indicators

and popular diets. A total of 10,014 adults, aged 19 years and older, from the 1994-1996 Continuing Survey of Food [Intakes] by Individuals (CSFII) were used to examine the relationship between prototype popular diets and diet quality as measured by the healthy eating index (HEI), consumption patterns, and body mass index. The CSFII was included in the analyses. The authors found that diets high in carbohydrates and low in moderate fat tend to be lower in energy; the lowest energy intakes were those of the vegetarian diet.

Masuo, D., Fong, G., Yanagida, J., and Cabal, C. 2001. Factors associated with business and family success: A comparison of single manager and dual manager family business households. *Journal of Family and Economic Issues* 22(1):55-73.

The purposes of this article are: (1) to identify internal/micro-level factors associated with perception of family and business success, and (2) to compare single manager and dual manager family business households with respect to factors that contribute to their perceptions of business and family success. The data are from a nationally representative sample of 673 family business households. Using a two-stage least squares regression procedure, the results show a unique relationship between family success and business success. Family success positively impacts business success, but not vice versa, and predictors of family and business success vary widely between household types.

Rimal, A., Fletcher, S.M., McWatters, K.H., Misra, S.K., and Deodhar, S. 2001. Perception of food safety and changes in food consumption habits: A consumer analysis. *International Journal of Consumer Studies* 25(1):43-52.

The relationship between seven types of food safety concerns and the corresponding change in food consumption habits of 236 households in Georgia, USA was evaluated. Results showed a gap between food safety concerns and food consumption habits. Gaps were particularly evident in the cases of pesticide residues, animal drug residues, growth hormones and bacteria. For example, more than 54% of sample households were extremely concerned about pesticide residues, but only 35% actually took extreme precaution in buying items, considering this perceived threat. The study indicated that educating consumers about preventive methods to reduce food safety threats will lead to reduced concerns and changes in food consumption habits.

Teisl, M.F., Bockstael, N.E., and Levy, A. 2001. Measuring the welfare effects of nutrition information. *American Journal of Agricultural Economics* 83(1):133-149.

Cost/benefit analysis justifies regulations altering the amount of health-related information presented to consumers. The current method of benefit analysis, the cost of avoided illness, is limited; it assumes the benefits of health-related information are adequately represented by changes

in illnesses. The manuscript develops a benefit estimation method to measure the welfare impacts of providing nutrient information. Nutrient labeling significantly affects purchase behavior but may not lead to increased consumption of healthy foods. Nutrient labeling may increase welfare without any change in health risk. Thus, the cost of avoided illness approach can under-estimate the social benefits of providing nutrient information.

Walden, M.L. 2001. Are two incomes needed to prosper today? Evidence from the 1960s to the 1990s. *The Journal of Consumer Affairs* 35(1):141-161.

Consumer Expenditure Survey data from 1960 to 1996 are used to examine trends in real consumption, real after-tax income, market work time, and real after-tax wages for single-earner and dual-earner households. Over the entire time period, most households experienced substantial improvements in measures of their prosperity. However, economic progress was considerably reduced when the comparison was from 1972 to 1996. Also, wage changes dominated changes in market work time over all time periods.

Official USDA Food Plans: Cost of Food at Home at Four Levels, U.S. Average, October 2001¹

AGE-GENDER GROUPS	WEEKLY COST				MONTHLY COST			
	Thrifty plan	Low-cost plan	Moderate-cost plan	Liberal plan	Thrifty plan	Low-cost plan	Moderate-cost plan	Liberal plan
INDIVIDUALS²								
CHILD:								
1 year	\$16.50	\$20.30	\$23.80	\$28.90	\$71.50	\$88.00	\$103.10	\$125.20
2 years	16.50	20.30	23.80	28.90	71.50	88.00	103.10	125.20
3-5 years	17.90	22.30	27.60	33.00	77.60	96.60	119.60	143.00
6-8 years	22.20	29.60	36.90	43.00	96.20	128.30	159.90	186.30
9-11 years	26.30	33.60	43.00	49.80	114.00	145.60	186.30	215.80
MALE:								
12-14 years	27.30	38.00	47.10	55.40	118.30	164.70	204.10	240.00
15-19 years	28.00	39.20	48.80	56.40	121.30	169.90	211.50	244.40
20-50 years	30.00	39.00	48.50	58.70	130.00	169.00	210.20	254.30
51 years and over	27.10	37.10	45.60	54.70	117.40	160.80	197.60	237.00
FEMALE:								
12-19 years	27.30	32.80	39.80	48.00	118.30	142.10	172.50	208.00
20-50 years	27.30	34.00	41.40	53.10	118.30	147.30	179.40	230.10
51 years and over	26.70	33.20	41.10	49.10	115.70	143.90	178.10	212.80
FAMILIES:								
FAMILY OF 2³:								
20-50 years	63.00	80.30	98.90	123.00	273.10	347.90	428.60	532.80
51 years and over	59.20	77.30	95.40	114.20	256.40	335.20	413.30	494.80
FAMILY OF 4:								
Couple, 20-50 years and children—								
2 and 3-5 years	91.70	115.60	141.30	173.70	397.40	500.90	612.30	752.60
6-8 and 9-11 years	105.80	136.20	169.80	204.60	458.50	590.20	735.80	886.50

¹Basis is that all meals and snacks are purchased at stores and prepared at home. For specific foods and quantities of foods in the Thrifty Food Plan, see *Thrifty Food Plan, 1999, Executive Summary*, CNPP-7A; for specific foods and quantities of foods in the Low-Cost, Moderate-Cost, and Liberal Plans, see *Family Economics Review*, No. 2 (1983). The Thrifty Food Plan is based on 1989-91 data and the other three food plans are based on 1977-78 data; all four plans are updated to current dollars using the Consumer Price Index for specific food items.

²The costs given are for individuals in 4-person families. For individuals in other size families, the following adjustments are suggested: 1-person—add 20 percent; 2-person—add 10 percent; 3-person—add 5 percent; 5- or 6-person—subtract 5 percent; 7- (or more) person—subtract 10 percent.

³Ten percent added for family size adjustment.

Consumer Prices

Average percent change for major budgetary components

Group	Annual average percent change from December of previous year to December:			Percent change 12 months ending with October 2001
	1990	1995	2000	
All Items	6.1	2.5	3.4	2.1
Food	5.3	2.1	2.8	3.4
Food at home	5.8	2.0	3.0	3.6
Food away from home	4.5	2.2	2.4	3.1
Housing	4.5	3.0	4.3	2.9
Apparel	5.1	0.1	-1.9	-2.5
Transportation	10.4	1.5	4.3	-1.4
Medical care	9.6	3.9	4.2	4.6
Recreation	NA	2.8	1.4	1.4
Education and communication	NA	4.0	1.2	3.4
Other goods and services	7.6	4.3	4.5	4.6

Price per pound for selected food items

Food	Price per pound unless otherwise noted (as of December in each year)			October 2001
	1990	1995	2000	
Flour, white, all purpose	\$.24	\$.24	\$.28	\$.31
Rice, white, long grain, uncooked	.49	.55	NA	NA
Spaghetti and macaroni	.85	.88	.88	.92
Bread, white	.70	.84	.99	1.01
Beef, ground, uncooked	1.63	1.40	1.63	1.71
Pork chops, center cut, bone-in	3.32	3.29	3.46	3.57
Chicken, fresh, whole	.86	.94	1.08	1.12
Tuna, light, chunk	2.11	2.00	1.92	2.00
Eggs, grade A, large, per dozen	1.00	1.16	.96	.92
Milk, fresh, lowfat, per gallon	NA	2.31	2.66	2.68
Butter, salted, grade AA, stick	1.92	1.73	2.80	3.69
Apples, red delicious	.77	.83	.82	.89
Bananas	.43	.45	.49	.50
Oranges, navel	.56	.64	.62	NA
Potatoes, white	.32	.38	.35	.42
Lettuce, iceberg	.58	.61	.85	.81
Tomatoes, field grown	.86	1.51	1.57	1.27
Broccoli	NA	.76	1.52	1.01
Carrots, short trimmed and topped	.43	.53	NA	NA
Onions, dry yellow	NA	.41	NA	NA
Orange juice, frozen concentrate per 16 oz.	2.02	1.57	1.88	1.90
Sugar, white, 33-80 oz. pkg.	.40	.39	.40	.43
Margarine, stick	.87	.79	NA	NA
Peanut butter, creamy	2.09	1.78	1.96	1.94
Coffee, 100% ground roast	2.94	3.75	3.21	3.02

NA = Data not available.

Selected items from CPI Detailed Reports, Bureau of Labor Statistics, various issues. Price changes are for all urban consumers. Food prices are U.S. city average.

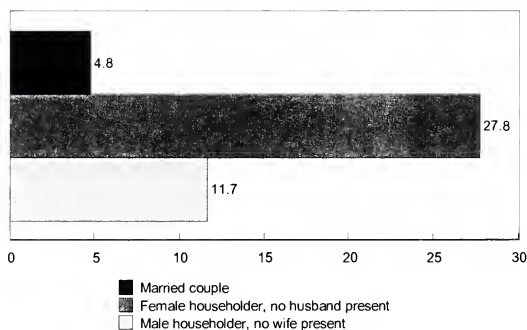
U.S. Poverty Thresholds and Related Statistics

Poverty Thresholds in 2000, by size of family and number of related children under age 18

Size of family unit	Related children under age 18								Eight or more
	None	One	Two	Three	Four	Five	Six	Seven	
One person (unrelated individual)									
Under 65 years	\$8,959								
65 years and over	8,259								
Two people									
Householder under 65 years	11,531	\$11,869							
Householder 65 years and over	10,409	11,824							
Three people	13,470	13,861	\$13,874						
Four people	17,761	18,052	17,463	\$17,524					
Five people	21,419	21,731	21,065	20,550	\$20,236				
Six people	24,636	24,734	24,224	23,736	23,009	\$22,579			
Seven people	28,347	28,524	27,914	27,489	26,696	25,772	\$24,758		
Eight people	31,704	31,984	31,408	30,904	30,188	29,279	28,334	\$28,093	
Nine people or more	38,138	38,322	37,813	37,385	36,682	35,716	34,841	34,625	\$33,291

Source: U.S. Census Bureau.

Percent of families in poverty by type of family: 1999



Source: U.S. Census Bureau.

Family Economics and Nutrition Review
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